# ELECTRICAL REVIEW

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Vol. CXXVIII. No. 3292 DECEMBER 27, 1940 SIXPENCE


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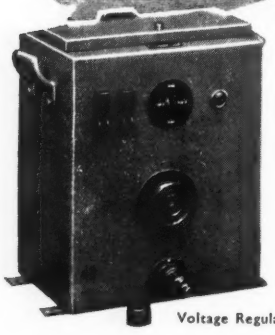

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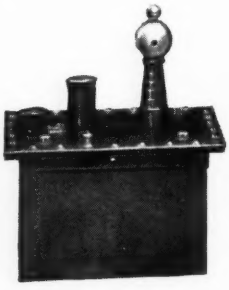

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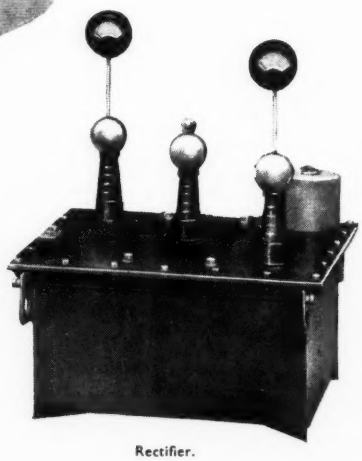

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THE
# ELECTRICAL REVIEW

Volume CXXVIII — No. 3292

Friday, December 27th, 1940

## Contents


| | Page | | Page |
|---|---|---|---|
| Editorial—Safety in Mines | 173 | Correspondence | 185 |
| Works Modernisation Scheme | 175 | Cinema Auditoria Acoustics | 185 |
| Personal | 178 | Manufacturers' Policies. By "Sala" | 186 |
| Electrical Tachometers By T. Thorne Baker | 179 | Commercial and Industrial News | 187 |
| Institution Proceedings | 181 | Electricity Supply | 189 |
| Shelter Heating | 182 | United States Electrical Trade | 190 |
| Fire Risks. By F. H. Sharpe, B.Sc., M.I.E.E. | 183 | New Patents | 191 |
| Timing Catapult Speeds | 184 | Financial Section | 192 |
| | | Contract Information | 195 |

Classified Advertisements (Official Notices, Situations Vacant, etc.) - - - - 39

Index to Advertisers - - - - - - - - - - 56


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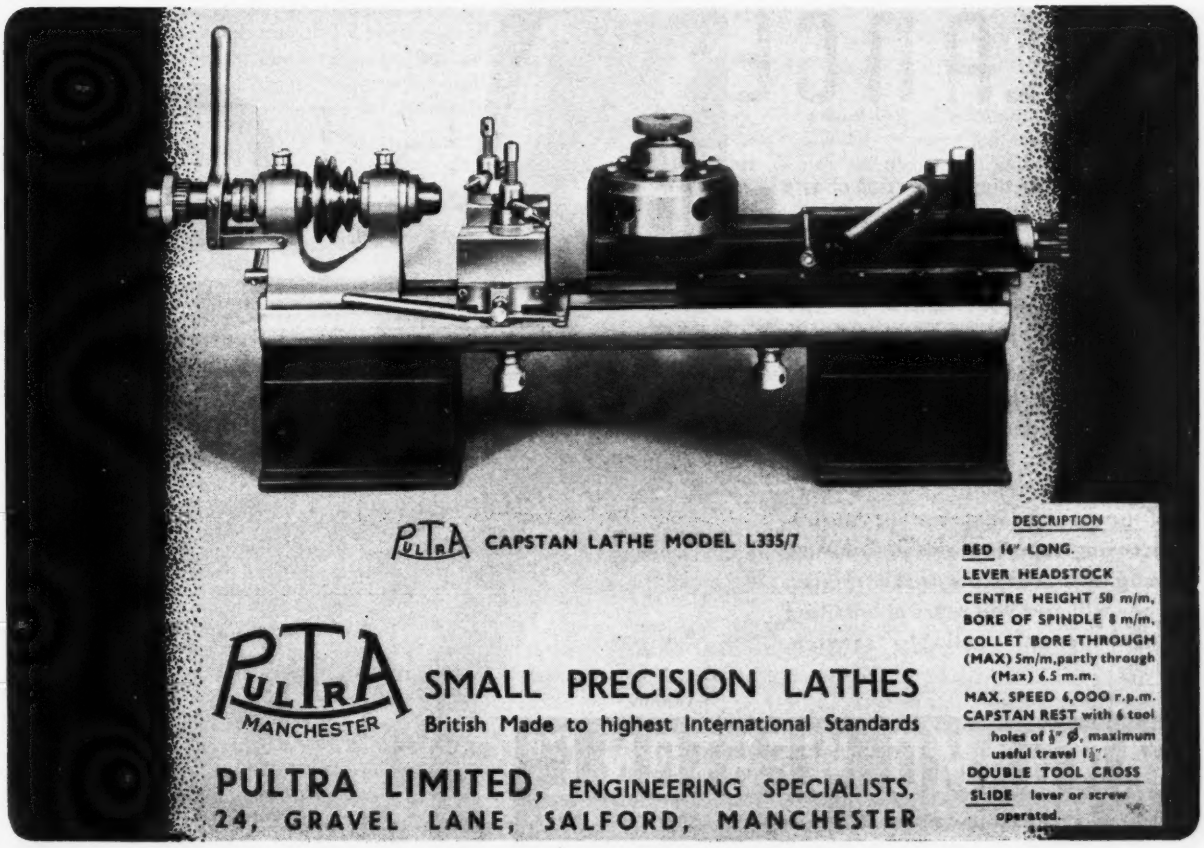
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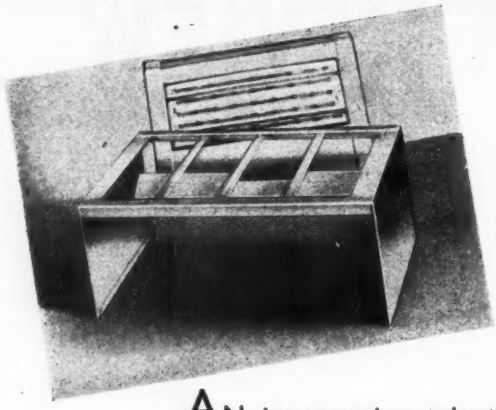

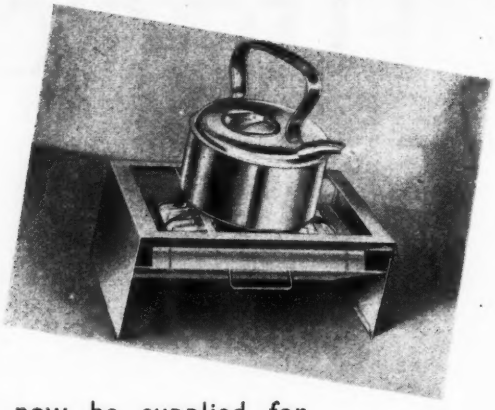

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THE
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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVIII. No. 3292 DECEMBER 27, 1940 Price SIXPENCE

# Safety in Mines

## Probable Form of New Regulations

IT is twenty-seven years since the present regulations governing the installation and use of electricity in collieries came into force. That they have stood the test of time remarkably well is indicated by the relatively small number of mining accidents that can truthfully be ascribed to electricity, the figure remaining almost constant year after year and forming only about 0.033 per cent. of the total from all causes. The lasting quality of these Regulations is doubtless due, first, to an appreciation by their compilers of the value of flexibility in allowing scope for the evolution of new ideas based upon experience and technical progress and, secondly, to wise interpretation of their intentions by those whose duty it has been to give effect to them.

### More Specific

Small as the proportion of electrical pit accidents is, however, it is clear from the analysis of typical instances given in the annual reports drawn up by Mr. J. A. B. Horsley, when Electrical Inspector of Mines, that it could have been materially reduced if the best modern practice had everywhere been followed. It may be deduced from evidence submitted to the Royal Commission on Safety in Mines, which issued its recommendations two years ago, that the time is now ripe for a revision of the Regulations, chiefly in the direction of making them more specific in certain respects.

The detailed drafting of a new code was entrusted to a committee, now presided over by Professor W. M. Thornton, and the result of its deliberations will no doubt be forthcoming in the near future. In the meantime some idea of what the principal features of the new Regulations are likely to be can be gained from the articles contributed by Mr. Horsley to recent issues of the ELECTRICAL REVIEW.

Electrical hazards in collieries are, broadly, of two kinds—the special one of fire-damp ignition and the more general one of shock. The first is bound up with the question of ventilation and, it may be anticipated, will furnish grounds for more precise definition of the conditions of use of electricity at the coal face and in safety-lamp areas. As a second line of defence, it seems probable that only flameproof apparatus that has been awarded the Buxton certificate will be permitted in such circumstances. Doubtless, also, the experience that the adoption of very low voltages for communications and signals does not in all cases ensure safety will be taken into account. There is the further possibility that the use of metallic screens for flexible cables connecting portable apparatus will be obligatory.

Regarding risks of shock, while, in principle, conditions in mines are not very different from those found elsewhere, it is to be expected that attention will be paid to the large proportion of accidents below ground that arises out of the use, or misuse, of switchgear, plugs and flexible cables. Automatic protection, remote control and neutral earthing provide obvious matters for more precise treatment than formerly, while overhead lines on the surface will almost certainly have to be of a standard equivalent to that prescribed by the Electricity Commissioners. In line with other recent official regulations, the new code will, no doubt, include frequent references to British Standard Specifications as criteria for materials and construction.

### The Engineer's Status

So much for the apparatus itself. Sound design, however, is only one aspect of the problem. In order to fulfil the purpose of the projected Regulations, it must be associated with high standards of installation, operation and maintenance, bearing in mind the rough usage to which mining plant is often subjected. That at once raises the question of the status of the colliery electrical engineer and his staff, and Mr. Horsley's claim that the engineer should have a decisive voice in the choice and supervision of the plant, for which he should be in a position to accept responsibility, seems unanswerable.

In view of the special conditions of colliery working, some form of official recognition of competence is highly desirable. This could best be given by stipulating that any grade of skilled electrical employee should hold an appropriate certificate of the kind that is now

awarded by the Association of Mining Electrical Engineers on a voluntary basis. The merit of the method of examination instituted by the Association is that, while it is based on technical knowledge, it gives due weight to the personal qualities called for in mining operations. Certification on these lines would, we believe, constitute a definite advance in the direction of greater safety which the revision of the Regulations has as its main object.

**E.I.B.A.'s Wartime Needs**

IN normal times the Electrical Industries Benevolent Association receives insufficient funds to do all that it would like to do. War has not only cut down its income but at the same time added to its burdens. Revenue derived from social events (£2,000 annually) has practically dried up and the absence of many members with the Forces has also had a diminishing effect upon income. Special wartime activities include the assistance of people who have lost their homes, the securing of supplementary pensions for beneficiaries and of allowances for evacuees, and extra work in many other directions. In drawing attention to the position Mr. P. V. Hunter, the president of the Association, says that in spite of all difficulties the work has been carried on, and up to the present every case which has come up has been fully assisted—financially and in all other possible ways. Members are asked to consider increasing their subscriptions, while those who have not yet joined are urged to do so now.

**Keeping in Touch**

IN this issue a correspondent stresses the need for electrical salesmen who have joined the Forces to keep themselves abreast of developments by studying their trade journals. This need, of course, extends to other members of the electrical industry in the same position. It is suggested that their former employers often have spare copies of trade papers which they could pass on. The idea is a good one as it serves the dual purpose of keeping the employers in touch with their Service employees and the latter in touch with the industry of which, although temporarily separated from it, they still form a part. Our correspondent's main theme is the employment of women in the industry—but that is another story.

**Fire Prevention**

WHILE fires due to electricity do not constitute a major risk numerically speaking, their effects may be far-reaching. On several counts this risk is greatly intensified at the present time by the possibilities of aerial bombardment. The most serious part of it, as concerning the greatest number of people, relates to power stations and substations, but every effort to reduce hazards on individual premises, more particularly in rural areas, should be made. The first aspect is covered in this issue by Mr. F. H. Sharpe, who discusses how far methods of coping with fires that are accepted, but not by any means everywhere adopted, are adequate for wartime. The second aspect provides the main theme of Mr. T. C. Gilbert's I.E.E. paper, reported on another page, on the use of voltage-operated earth-leakage protection, of which he has been so stout an advocate for many years in the ELECTRICAL REVIEW. The conclusion to be reached in each case is that the principles remain the same in peace and war, but that the case for applying them now is far more urgent. Unlike many emergency measures, however, they will have the merit of being of lasting value.

**Electrics in Australia**

OUR Australian contemporary, the *Electrical and Radio Trader*, mentions that attempts are being made to create a market in the Commonwealth for electric vehicles. It expresses the hope that "supply authorities will realise their duty and place facilities at the disposal of the public who adopt electricity for this purpose." Previous efforts to popularise the electric in Australia are said to have met with apathy on the part of electrical interests. How like our own experience this sounds, although it must be said that the last two or three years have seen an improvement. But we think that the *Trader* paints a rather rosy picture of the situation here when it mentions the thousands which have been put into commission during the last twelve months and the establishment of battery service stations. It conjures up a view of roads teeming with electrics, with service stations as frequent as petrol pumps. Oh that this were true!

**Electricity "Takes It"**

ALTHOUGH it was undoubtedly wise of Lord Woolton last week to urge that local authorities should provide coal for cooking purposes in the communal feeding centres set up for air-raid victims, this measure should be regarded as merely a stand-by. Instances continue to come to our notice of the way in which electricity supply is being maintained under the most gruelling conditions. It is now permissible to mention, for instance, that the supply at Southampton remained available throughout the vicious attack at the end of last month.

**Thunder and Turf**

WHEN the Electricity (Supply) (Amendment) Bill reached its final stage in the Irish Dail recently some of the Government's critics thundered against the Turf Development Board, which is working in co-operation with the Electricity Supply Board. Mr. J. M. Dillon (Monaghan) said that Mr. Lemass, the responsible Minister, had promised that the turf industry would become, next to agriculture, the country's biggest industry. The member went on to say, according to the *Irish Times*: "As it had turned out the only people who had made a profit out of the scheme were the people who supplied the bags. The bags were subsequently lost by the Turf Development Board, and all that they had left of the scheme were the inspectors who were looking for the bogs." A veritable Slough of Despond it would seem.

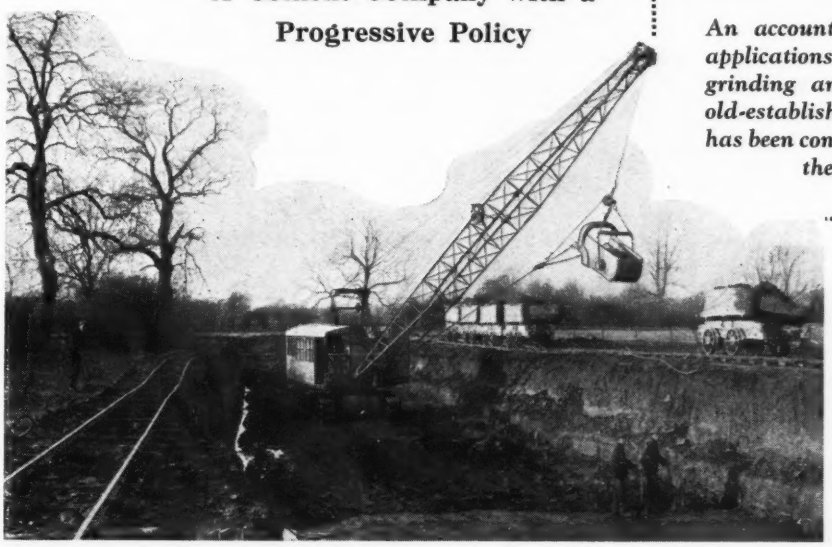
**Fleetwood Finance**

No doubt the ratepayers of Fleetwood (at least those who are not electricity consumers) will have noted with pleasure that although the Corporation electricity undertaking incurred a net loss of £1,368 for 1939–40 it was still able to contribute £1,790 from the reserve and revenue balances to the aid of the rates. The consumers who have just been notified of a third wartime increase in prices will not be so pleased.

# WORKS MODERNISATION

## A Cement Company with a Progressive Policy

*An account of up-to-date electrical applications to quarrying, crushing, grinding and other processes in an old-established cement works which has been considerably extended during the past two years*

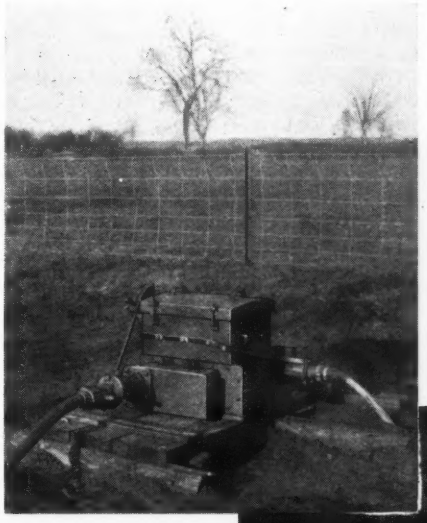


**Electric navvy at work in the quarry culvert**

THE Barnstone Cement Co., Ltd., whose plant is the subject of this article, was founded about 1875 under its earlier name of the Barnstone Blue Lias Lime Co., Ltd. It changed its name in 1896 to the Barnstone Cement Co., Ltd., when the manufacture of cement became of primary importance.

Three different cement plants were erected and discarded during this period, and the present and fourth factory which was started up in 1928, is designed and equipped on the most modern lines, being electrically driven throughout. It has recently been considerably extended.

The plant at the quarry, which is adjacent to the cement works, has also been redesigned and extended during the last two years, and is now furnished with compressed air drills fed from a pair of electrically-driven compressors in the switch-house, and with an electric navvy drag-line equipment with a 60-ft. jib which is used to remove overburden in the quarry and expose the layers of stone. Simplicity of operation is the keynote of this navvy, all the movements being effected from one continuously-running 60-HP, 3,300-V, three-phase B.T.H. induction motor under mechanical controls.



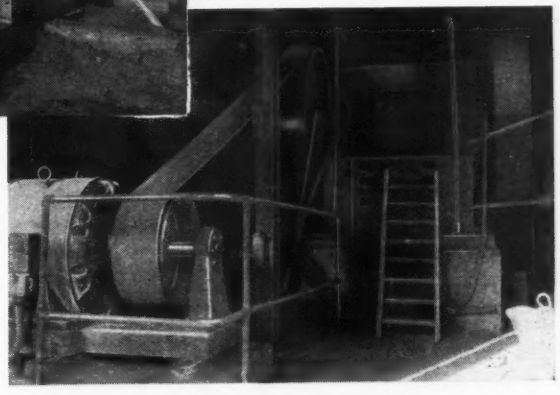
**Switch and plug unit at the quarry side for the trailing-cable supply to the electric navvy**

This motor is mounted in the usual cabin on the supergear platform, together with its controlling circuit-breaker and auto-transformer starter. The motor first drives through a reduction gearing with an actual speed ratio of 965 RPM to 150 RPM on to the live shaft of a pair of winding drums which serve the booming operations. Between the two drums there is a crown wheel which provides for the reversing operations, either drum being engaged with the crown wheel under lever control by which is imparted to the drums a side movement so as to engage and disengage the drums, respectively, with the crown wheel according to the direction of booming and hence winding which may be required.

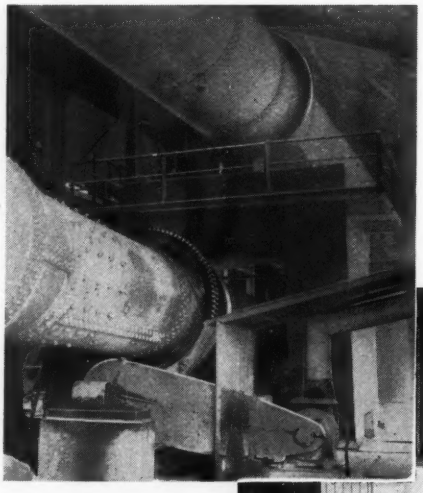
By means of an ordinary pinion gear with a speed reduction ratio of about ten to one power is further transmitted from the first live shaft (booming) to a second live shaft on which are two further drums for effecting hoisting and dragging operations, respectively. On each drum there are a stationary band for braking and a revolving band for driving, the latter being tightened or loosened by toggle operation under lever control.

Immediate supply to the navvy is by means of a tough-rubber sheathed trailing cable on a drum at the front bottom of the navvy. The trailing cable connects with a set of slip-rings inside the drum, and by means of suitable brushgear these slip-rings are connected to a set of collecting rings in the horizontal plane under the supergear platform. Through suitable brushgear connection is then made to the motor equipment in the cabin above. The trailing cable is fed from

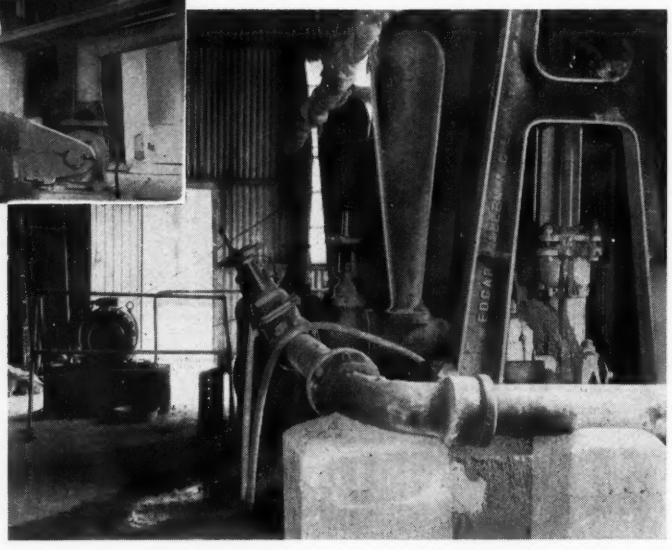
**Below : A 40-tons per hour jaw crusher driven by a 125-HP slip-ring motor**



either of four plug units spaced at about 160 yards along the side of the culvert. Each plug unit consists of an oil circuit-breaker, suitably interlocked with the watertight plug unit, secured to the front of the tank and a straight-through main cable connector bolted to the back of the tank. Thus at each plug point there is a tee-off connection from a 3.3-kV main which runs the whole length of the culvert from a new distribution house at the works end of the quarry.

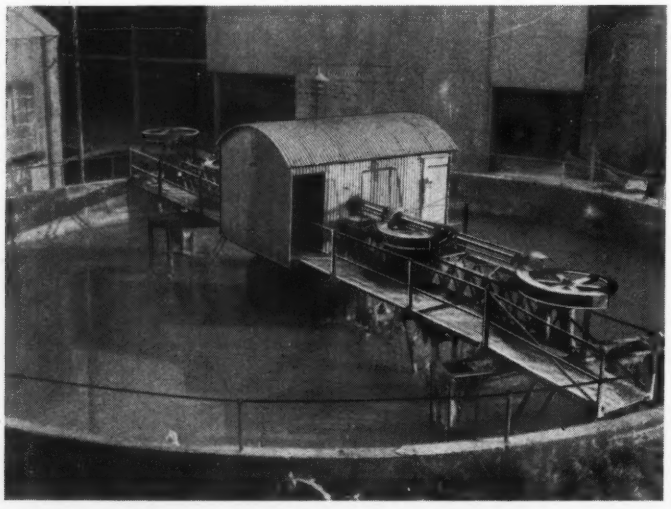


A 15-HP pipe-ventilated geared motor drives the clinker cooler and air heater; note the cement kilns above



Right: Slurry is pumped from the main mixing tanks to the kilns by either of two sets of three-throw ram pumps driven by a 20-HP motor

At this new switchhouse, which is about 2,000 ft. from the far end of the quarry, a supply at 3.3 kV is received at a three-unit metalclad switchboard with two outgoing components, one serving the quarry main already referred to and one supplying two compressors in the same building through a 440-V transformer. The board is fitted with complete earth leakage protection in accordance with the Quarry Regulations. Each of the compressors, which supply the drills in the quarry at 100 lb. per sq. in., is driven by a 27½-HP slip-ring induction motor with ordinary drum-type rotor resistance control. One of the motors is a Crompton Parkinson unit with an Erskine Heap controller, and the other is a Lancashire Dynamo Co. machine served by an Allen West controller.



This "Sun & Planet" slurry mixer holds 500 tons and is driven by a 25-HP motor

The new quarry may be regarded as a works extension, for it is adjacent to an old quarry which is awaiting electrification by conversion of the existing Diesel and steam drives, and it was interesting to hear from the works staff comments regarding the comparatively high maintenance costs at the old quarry.

Limestone from the quarries is received by rail at the works primary crusher. This equipment, which has a 42-in. by 30-in. jaw, will deal with about 40 tons of stone per hour and is driven by a 125-HP slip-ring motor served by a drum-type rotor resistance controller. Transmission to the jaw shaft is by a simple long and heavy belt drive effecting an actual speed reduction from 585 RPM to 200 RPM. There are auxiliary belt drives from the jaw shaft which provide for the automatic operation of fingers which draw the stone into the jaws. After being reduced to about 3-in. or 4-in. screen size the stone is then belt conveyed to a 3-in. revolving drum screen, the rejects from which fall to a set of crushing rolls which further reduce the stone to about 1 in. The screen and the crushing rolls are together driven by a 30-HP motor with transmission and control arrangements similar to those of the large crushers.

Stone from the screen and secondary crushing plant is then bucket elevated to a steel band conveyor at the top of and feeding a pair of silos. A 15-HP motor at the top of the silos serves both the elevator and band conveyor. Crushed stone from the silos is belt conveyed to a wet grinding mill, passing *en route* a hammer mill with a 30-HP drive which further reduces the stone to about ½ in. The wet grinder is of the revolving horizontal drum ball type equipped with about 40 tons of steel balls. It is driven by a 300-HP slip-ring motor served by a liquid starter and an oil circuit-breaker, and transmission is through a Power Plant Co. double helical gear giving a speed reduction from 720 RPM to 188 RPM. An older wet mill has a direct drive from a 244-RPM motor.

A bucket wheel raises the slurry from the wet mills to a pair of open-tank triple mixers, the six stirrers of which, three on each line, are all driven from a 30-HP motor which transmits by belt, first to a countershaft and then to a line shaft, and finally through bevel gears to each of the

stirrers. The overall speed reduction from the motor to the mixer shaft is from 715 RPM to 20 RPM. Through worm reduction gear a 7½-HP motor drives the slurry wheel.

An important function of the mixing tanks is the correction of the composition of the slurry, and after the suitable mixture has been obtained the slurry is allowed to flow down into a main mixing tank which is 66 ft. in diameter and holds about 500 tons. This main mixing tank is spanned by a girder structure which revolves on a central plinth rising out of the slurry, and from either side are suspended two stirrers. A shaft along each arm drives the stirrers through bevel gears, and the reaction of the stirrers alone drives the main revolving structures. The driving shafts along the two stirrer arms are driven through pinion gears from a countershaft which, in turn, is driven by a 25-HP 720-RPM squirrel-cage motor housed in a cabin at the centre of the main structure.

Slurry is pumped from the main mixing tank by either of two sets of three-throw ram pumps driven by a 20-HP motor with simple belt transmission giving a speed reduction from 720 RPM to 300 RPM. In the pump line shaft between the pumps there is a sliding pinion for selecting the drive. At the upper end of one of the slightly inclined kilns is a cup feeding wheel which is driven by a 1½-HP slip-ring motor with variable speed rotor resistance control from the firing platform at the other end of the kiln. The use of the ordinary slip-ring motor for variable-speed work is a feature of the electrical installation, the kiln drives being a particular example. One kiln is served by a 30-HP motor and the other by a 40-HP machine, and in each case the motor at the ground level belt drives to the pinion and crown gearing at the kiln level about 20 ft. above ground level. The motor speed range is from 200 to 720 RPM in six stages on the controller, and the reduction ratio by belt is about five to one. From the pinion and crown gearing transmission is continued through a reduction gear to a spur wheel, and finally on to a simple gearing around the periphery of the kiln.

### Coal-handling Equipment

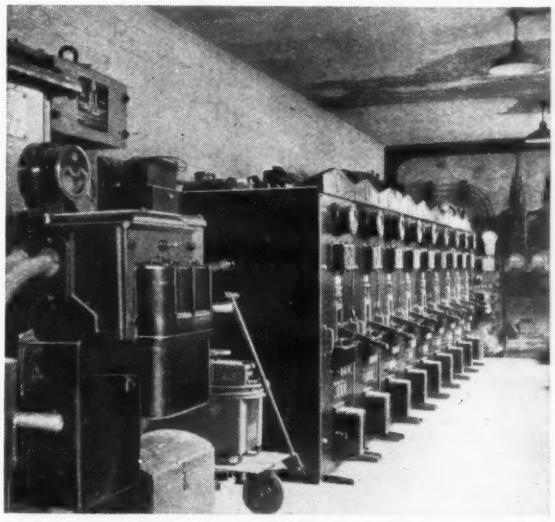
From an overhead bunker coal is worm conveyed to a ball coal mill, the conveyor and coal mill having, respectively, 3-HP and 75-HP drives. A high-speed fan draws hot air from the kiln and, in turn, through the coal mill, a classifier, a cyclone and finally to the dust hopper. The kiln burner is fed from the dust hopper *via* a Crofts variable-speed drive by a 20-HP slip-ring motor with a short V-belt transmission effecting a speed increase of one to two ratio, the motor speed range being from 500 to 715 RPM. The coal mill, which has a capacity of 35 cwt. per hour, is driven by a 75-HP motor; it is revolved at 28 RPM by belt and pinion gear transmission from the 720-RPM motor.

Clinker from the kiln falls into an inclined drum-type cooler driven by a 15-HP geared motor through a chain and a pinion wheel engaging the simple gearing round the periphery of the drum. The speed reduction at the motor unit itself is from 1,440 to 79 RPM, and the chain reduction ratio is about 45 to 1. The cooler motor is pipe-ventilated by means of an internal fan on the motor shaft. Combustion air for the kiln is first passed through the cooler, so that valuable heat recuperation from the clinker is effected. Combustion gases from the kiln follow a tortuous path in a mixer chamber which receives the overflow of slurry from the kiln feeder, and the dust settles to the slurry in the tank at the bottom into which it is mixed by agitators driven by a 10-HP 720-RPM motor with transmission by belt and bevel gears.

A 40-HP motor-driven induced-draught fan pulls the air through the kiln to the chimney. Clinker from the cooler falls into shaker trays from which it is elevated to clinker silos. A cross shaker tray feeds the first tray which also conveys the clinker to the mills. The shakers are driven by 7½-HP motors through crank shafts.

The clinker is ground into cement in a horizontal ball and tube mill driven by 450-HP 440-V slip-ring motor with a liquid starter and an oil circuit-breaker. Transmission is first to a countershaft through a belt flexible coupling which relieves the rotor shaft of shock, and then through a spur wheel direct on to gearing around the mill shell. The overall speed reduction is from 244 RPM at the motor to 23 RPM at the mill. The mill capacity is 10 tons per hour. The ground clinker is now the product of the works and after storage in cement silos is bagged as required.

One method of bagging is to remove the cement from the silos by a worm conveyor which passes the product directly into the bag on a weighing machine. In the other method the cement is sucked from the silo into the bag suitably placed in a hermetically sealed bagging chamber in which a vacuum is created by an air pump. Practically all the



**The whole of the works proper is supplied at 440 V from this nine-panel distribution board. Left : Power-factor correction condensers ; right : Main lighting distribution gear**

motors throughout the works proper are of G.E.C. manufacture.

Supply is received at the works at 11,000 V from the Derbyshire and Nottinghamshire Electric Power Company by four incoming feeders on an eight-panel steel cubicle switchboard in a brick substation. Two outgoing feeders control 1,250-kVA transformers for the 440-V distribution throughout the works proper, and a third outgoing unit controls a 300-kVA transformer for the 3.3-kV supply to the quarry *via* the quarry switch-house. The eighth unit on this extra-high-voltage switchboard is a bus-coupler. A main distribution centre backs on to a substation, and a nine-panel truck type distribution board has two incoming supplies from the 440-V transformers next door. There are a 240-kVA and a 120-kVA T.C.C. and a 120-kVA B.I. power-factor correction condensers in line with the distribution board. The main distribution for lighting, 250 V phase-to-neutral, is also effected in this centre.

Distribution for power from this main centre to sub-distribution boards at load centres throughout the works and from the sub-boards right up to the motors is by p.i.l.c., armoured cables laid underground, and for lighting distribution there are similar cables to sub-distribution boards from which run v.i.r. cables in screwed conduit.

We are indebted to Mr. J. Ward, managing director of the Barnstone Cement Co., Ltd., for permission to visit the works and take the accompanying photographs, and to Mr. J. C. Ward, assistant manager, and Mr. H. Turner, electrical engineer, for their assistance.

# PERSONAL AND SOCIAL

## Information regarding new appointments and other matters of interest for this page are welcomed

AT a meeting of the Chester Electricity Committee last week, it was reported that the electrical engineer (Mr. S. E. Britton, M.I.E.E., M.I.Mech.E.) was due to retire on superannuation on April 11th next and that Mr. Britton had offered to continue his services in view of war conditions. The Committee resolved that Mr. Britton should be thanked for his generous offer, but that he should be placed on pension as from April 11th; and that applications should be invited for the position of electrical engineer at a salary of £1,100 per annum, rising by annual increments of £50 to £1,250.

Mr. S. E. Britton

The Committee was informed by the Town Clerk that correspondence had been received from the Standing Joint Committee of the Associated Municipal Electrical Engineers and the Electrical Power Engineers' Association, suggesting that any appointment made should be at a salary in accordance with the Walker Scale. There was also a letter from the Town Clerk of Worcester giving "certain information" regarding the recent appointment of a new chief engineer by that authority at a salary not in accordance with the scale.

When the recommendations went before the City Council on December 18th, however, the Council decided that Mr. Britton's services should be retained for a further period but that his salary should be £1,250 per annum instead of the £1,505 which he is now receiving. Many tributes were paid to Mr. Britton during the three-hour debate on the subject.

**Mr. H. C. Godsmark,** general manager of Huddersfield Passenger Transport Department and operating manager of the Joint Omnibus Committee of the L.M.S. and Huddersfield, has been appointed general manager of Newcastle-on-Tyne City Council's transport and electricity undertaking in succession to **Mr. T. P. Easton,** who retires next March. The post carries a commencing salary of £1,200, rising to £1,400. Mr. Godsmark is a native of Leicester and was educated at Loughborough College. Before being appointed transport manager at Huddersfield he was deputy manager at Nottingham. Mr. Godsmark has had experience as technical assistant with the London County Council and Manchester Corporation Transport Departments. He received his engineering training with the Brush Electrical Engineering Co., Ltd. Mr. Godsmark is an associate member of the Institute of Automobile Engineers and a member of the Institute of Transport.

**Mr. Frederick Parkes,** production charge hand at the works of Rowlands Electrical Accessories, Ltd., has been awarded the George Medal in recognition of his conduct when the company's premises suffered from enemy action. Mr. Parkes, a member of the company's A.R.P. organisation, was not on duty at the time, but hearing that the premises had been hit, he immediately went to the works to render assistance. He found that a 3in. gas main had been broken and the gas had become ignited; adjoining premises were on fire. With the assistance of other members of the staff, and after several attempts, Mr. Parkes entered the burning building, was lowered head first through a small aperture into a cellar immediately under the damaged structure which was likely to collapse at any moment, and succeeded in turning off the gas at the main. His action undoubtedly saved the whole of the works from destruction.

Commendable conduct which resulted in three persons being rescued from a house demolished by a bomb has earned the Medal of the Order of the British Empire (Civil Division) for two N.W. England air-raid wardens. The awards have been made to **Mr. R. W. Parry,** of a Corporation Electricity Department, and **Mr. G. Kewley,** labourer. Both men were engaged as wardens and during an enemy raid a house received a direct hit and was demolished. Mr. Parry and Mr. Kewley rushed to the scene. One beam was wedged against a dividing wall of the house, and this was supporting a large amount of debris, and as there was a grave danger of its giving way, there was need to go about rescue work with extreme care. Mr. Parry succeeded in extricating a woman suffering from severe injuries, who was buried by debris. He handed her down to Mr. Kewley, who promptly rendered first aid. A little further on Mr. Parry saw the head and shoulders of a woman protruding from the debris and in her semi-conscious condition was moaning about her baby. Mr. Parry at once made a search and rescued the child, which was found to be unhurt. The child was also handed down to Mr. Kewley. Then, with the assistance of an unknown civilian, Mr. Parry rescued the mother who also received first-aid treatment from Mr. Kewley before being removed to hospital.

The London Students' Section of the Institution of Electrical Engineers held a successful tea-dance on December 14th at the Oak Restaurant, Kensington. About 100 members and friends were present, and with such support the Committee will endeavour to repeat the function early next year.

**Mr. J. F. Field, who, as we reported in our last issue, has been appointed deputy engineer and manager of the Edinburgh Electricity Dept.**

**Mr. Peter F. Bennett,** chairman of Joseph Lucas, Ltd., was on December 18th returned unopposed as member of the Edgbaston Division of Birmingham in succession to the late Mr. Neville Chamberlain.

**Mr. V. H. Bray,** A.M.I.E.E., was married recently to Miss Esther Morrison-Pickard at St. John's Church, Putney. Mr. Bray, who is at present at the Air Ministry, will be remembered by his associates in the theatre and cinema world as technical manager of the Major Equipment Co., Ltd.

**Lieut.-Col. W. A. Vignoles** is, unfortunately, indisposed and informs us that he is unable to get into personal touch with his many friends in the industry so as to give them his seasonal greetings, but he knows that they will appreciate that they have his sincerest wishes.

**Mr. W. H. Liggins,** deputy electrical engineer to the Hove Corporation, is to retire on pension in February.

**Mr. T. W. E. Corrigan,** who has been with the Tiverton Corporation for twenty-one years has resigned his position as manager of the borough electricity and gas undertakings owing to ill-health. A year or two ago Mr. Corrigan successfully supervised the changing over of the borough supply from DC to AC, a scheme costing £20,000.

**Admiral Henry W. Grant** has been appointed chairman and managing director of Marconi's Wireless Telegraph Co., Ltd., as from January 1st. Admiral Grant was managing director of the Eastern Telegraph Co. until the Cable and Wireless merger in 1929, since when he has been a director of the combine and its associated companies.

**Dr. E. A. Hanay,** who has been in charge of the Electrical Engineering Department of the Chesterfield Technical College for the past three years, has been appointed to a similar position at Coventry Technical College.

**Mr. Gus Hill** informs us that he has resigned his position as manager of the Brighton branch of Electrical Components, Ltd., to enable him to carry on business as agent for various manufacturers.

## Obituary

**Professor H. J. Spooner.**—The death is reported of Professor Henry John Spooner, formerly head of the school of engineering at the Regent Street Polytechnic, which occurred on December 16th at the age of eighty-four. Professor Spooner was appointed principal lecturer in mechanical science at the Regent Street Polytechnic in 1882, and four years later was appointed director and professor of mechanical and civil engineering, which position he held until his retirement in 1922.

**Sir H. H. Dalrymple-Hay.**—We regret to learn of the death on December 17th of Sir Harley Hugh Dalrymple-Hay, M.Inst.C.E., at the age of 79. After service with the Midland and London & South Western Railways he was appointed resident engineer for the Waterloo and City line, in which capacity he devised an improved tunnelling shield. Later he took a leading part in the design and construction of the London Underground railways, and he acted as consultant in connection with the Post Office Tube Railway. Among much other important work was his construction of a 570-ft. tunnel under the Hooghli, completed in 1931, to carry the cables of the Calcutta Electric Supply Corporation to Howrah.

At a meeting of the Stoke-on-Trent Council on December 19th, the Lord Mayor referred to the death of **Mr. C. H. Yeaman,** the former city electrical engineer, and it was resolved that the Town Clerk should send a letter of condolence to Mrs. Yeaman.

**Major H. Bell.**—We regret to hear that Major Herbert Bell, O.B.E., T.D., died recently at sea. Until last March he was general manager of the Glasgow Corporation Electricity Department, and before that, city electrical engineer of Hull. He was sixty-two years of age.

**Mr. G. R. Todman,** whose death occurred recently in London, was for many years head of the meter department of Siemens Electric Lamps and Supplies, Ltd.

**Mr. F. Tremain.**—The death occurred on December 12th of Mr. Francis Tremain, M.I.E.E., late of the Post Office Engineering Department. He was in his eighty-sixth year.

# ELECTRICAL TACHOMETERS

## Types of Counting Devices

By T. Thorne Baker

***Precise measurement of the rate at which a machine does its work is a necessary part of much engineering procedure. This determination may be carried out by means of tachometers, the uses of which vary widely in character***

A SPEED counting device may be required to record the number of newspapers per hour printed by a rotary press, the speed in feet per minute of a conveyor belt, the baking time of bread, the speed of a train in miles per hour, or the rate at which cinematograph film passes through the developing tank: these are but a few applications of the tachometer.

Measurement of the RPM of a rotating body is most obviously made with the aid of a mechanical device directly coupled to the shaft, or other rotating part which, in turn, operates some form of counter. When applied to high-speed machinery, mechanical coupling necessarily involves a good deal of wear and tear, in which respect the advantage of an entirely electrical method is readily appreciated.

The tachometer in its most general form depends upon the use of a miniature generator of electricity actuated by the rotating shaft, frequently termed the transmitter, and an indicating instrument calibrated in the appropriate units. In many cases it is a convenience to operate more than one indicator, one at the machine itself and another or several in various remote situations. Some forms of tachometer have the generator attached to the shaft itself; in other forms the generator is geared to, or belt driven by, the shaft. The indicating instrument can be of such high sensitivity that an extremely low power generator only is needed, so that the principle can be practically applied to many forms of delicate high-speed laboratory apparatus.

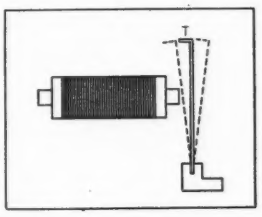



**Fig. 1.—Illustrating the principle of the Ayrton multiple-reed frequency meter**

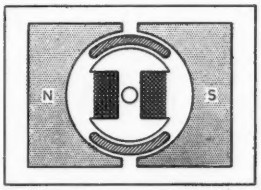



**Fig. 2.—Representation of generator with permanent magnet and armature both fixed**

A form of electrical indicator in early use depended on a contact maker on the shaft, a battery circuit being closed at each revolution as the contact was made, the currents operating a frequency meter of the Hartmann-Kempf or Siemens-Halske type. The multiple reed frequency meter was suggested originally by Professor Ayrton in 1889; it consists essentially of a number of tuned reeds set in a row, each of slightly different natural period, with an electromagnet so placed along the length of the row as to set them in vibration (fig. 1). The reed, the period of which is in tune with the number of contacts or impulses, is set in violent resonance as compared with those on either side which are slightly out of tune, and its top T (usually painted white) will be seen as a white line across the rectangular space in which the reed tops are arranged. The "white line" thus indicates against a scale of frequencies the rate of rotation of the shaft.

The main principles on which the modern tachometer functions are a proportionality of induced EMF to speed in a generator with constant flux, or proportionality of frequency to speed in an alternator. Thus DC or AC generators having permanent magnets indicate voltage as speed, or RPM, on a DC voltmeter, rectification in the latter case being obviously necessary. Alternatively a permanent magnet can be used to produce a torque on a conducting disc, or cylinder, proportional to the speed.

The simplest and probably the most popular type of instrument is the DC generator fixed directly on, or driven by, the rotating shaft. It will indicate the *direction* of rotation if the zero point of the indicating voltmeter be central on the scale, whereas AC tachometers will only indicate RPM independently of direction of rotation.

The revolving magnet type of AC generator, equipped with rotating magnets or inductors and stationary field windings, while not needing a commutator or sliding contacts, possesses the disadvantage that the scale of the indicating instrument is not uniform and closes rapidly towards zero. While commutators and brushes are liable to give trouble, instruments of the DC type, capable of long running without attention, have been made with conspicuous success. Permanent magnets are, however, liable to temperature changes and also to gradual demagnetisation due to mechanical vibration. A type of generator is represented in fig. 2 in which the permanent magnet and armature are fixed, the rotating part revolving in a very restricted air-space between the two.

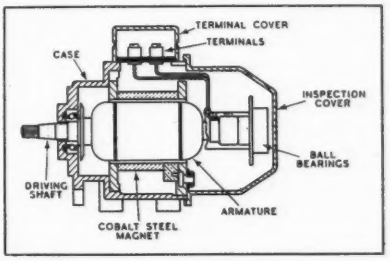



**Fig. 3.—"Record" DC tachometer generator**

In the DC instrument made by the Record Electrical Co., Ltd., permanent magnets of cobalt steel take the place of electrically-excited field coils. The construction is shown in fig. 3. A drum-wound armature runs on ball bearings in the field, and is standardised to give 100V at 2,000 RPM, at which speed the instrument is always preferably run. The cast-iron body is dust- and splash-proof, and the magnets are magnetically screened so that the transmitter can be secured to machinery, or placed near a dynamo, without its accuracy being affected. The commutator is air insulated between segments.

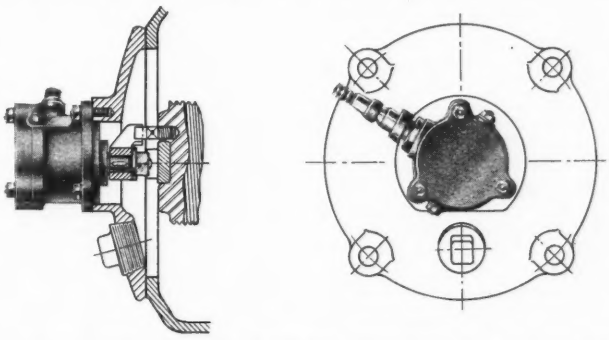


**Fig. 4.—Method of directly driving Stone electrical tachometer from end of locomotive axle.**

While in the case of heavy machinery the transmitter is driven by a heavy gear wheel, or chain drive, it may be belt driven in the ordinary way. The armature has a low resistance, so will provide sufficient current for a number of indicators if required. The indicators themselves are obtainable with a range of scales from 5¼in. to 36in. on dials ranging from 2½in. to 16in. in diameter. In the AC types made by the same company the current is passed through a Westinghouse metal rectifier so that the indicator gives a deflection proportional to the voltage. A hand tachometer of the AC type, complete in a leather case measuring only 9 in. × 7 in. × 3½ in., has also been

designed for obtaining the speeds of shafts, grinding wheels, drills and motors. The use of small copper-oxide rectifiers with AC generators for indicating on DC voltmeters deserves mention at this point.

A number of models are manufactured by Sangamo Weston, Ltd., suitable for both light and heavy duty. Here again a DC generator having a permanent field magnet and revolving armature has been used; the tachometers are driven by spur gear, chain or sprocket, pulley or direct coupling. One instrument designed for screwing directly on to an aeroplane tachometer outlet weighs only 1 lb. 5 oz. Geared or driven Weston tachometer generators, for general purposes, vary in weight from 3½ to 16 lb. A typical model has a ⅜-in. diameter shaft extension, is 6 in. long by 4 in. high and 4 in. wide. The permanency of the magnetic circuit is assured by an exceptionally small air-gap and very careful ageing of the magnetic system. The armature brushes are self-lubricating and carried on a self-aligning mount which equalises pressure. Improved accuracy is claimed to result from the use of high-sensitivity meters made possible by the high voltage generated. Many uses are quoted for the instruments, including the recording of the number of feet per minute in paper-making machinery, speed of pumps, baking time of wood veneer ovens, output per hour of bottle-making machines, applications to coal-stoking equipment, wire fabric machines, speed of revolving cement kilns, and so on.

Special attention has been paid to the problem of locomotive tachometry by J. Stone and Co., Ltd. Electricity is generated by a six-pole alternator designed for continuous running. When used on a locomotive, the drive is effected by means of a return crank attached to a main crank or coupling rod pin acting on a slotted lever articulated to the main spindle of the gear box. It may, however, be driven by means of an endless vee belt from a pulley wheel studded to the end of the axle of the engine bogie. For tender or coaching wheels the transmitter can be studded to the axle box cover and driven direct from the end of the axle (fig. 4).

The indicator is of the moving coil type. A metal rectifier is incorporated in the instrument itself, and a deflection of the pointer proportional to the voltage generated by the transmitter makes possible the calibration of a miles-per-hour scale in equal divisions. A great deal of attention has been paid to electrical construction in order that the indication shall be dead-beat and avoid flicker. This freedom is due to the use of the three pairs of poles in the rotor, and a step-up of 1 to 2.5 in the speed of running by means of a gear-box between it and the locomotive driving wheel. A very ingenious adjustment in the indicator also allows for variation in wheel diameter. The indicator, although DC reads clockwise irrespective of the direction of running.

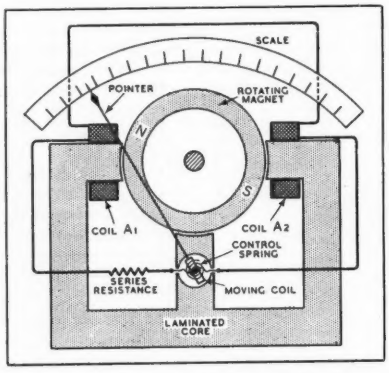



**Fig. 5.—Brown " Quadraflux " tachometer arranged for direct indication**

### An Australian Device

A new form of electric tachometer, practically unaffected by variations of temperature, was described recently by Dr. E. B. Brown (University of Melbourne) in the *Journal* of the Institution of Engineers in Australia. A revolving field magneto generator is used in conjunction with an iron-cored indicating instrument, so that there are no moving contacts in the electrical circuit. A strong alternating field of constant amplitude is provided in which a moving coil turns, the proportionality between voltage and speed being used to indicate the speed of rotation. This field has the same frequency and practically the same phase as the current in the moving coil.

In the direct reading form of instrument, termed the " Quadraflux " tachometer, the generator and receiver form a single unit. The moving coil is pivoted in a gap in an auxiliary pole situated midway between the main poles of the generator (fig. 5) and the moving coil is fed from the main pole windings through a high series resistance. The deflection produced for any speed is inversely proportional to the total resistance of the coil generator and the series resistance, so that the range of the instrument can be made dependent on the variation of resistance.

In a somewhat similar meter for distance indication the alternating field for the moving coil is provided by a laminated iron-cored electromagnet excited from an auxiliary phase of the generator leading on the main phase. The moving coil circuit is supplied from the main phase of the generator through a high series resistance as in the other instrument; it thus carries a small current which is proportional to the speed. This is Dr. Brown's " Quadrature " tachometer, which is claimed to have greater accuracy and to be more permanent than any other form of electrical tachometer and, especially in the case of aircraft, is not affected by extremes of temperature. The calibration is easily adjusted by means of the series resistance; and the indicating instrument cannot affect an adjacent compass.

Another type of problem for the tachometer is the measurement of rotational speed when little or no power is available. In measuring the speed of an ultra-centrifuge running at 90,000 RPM, a small brass disc of 15 mm. diameter with an iron segment dovetailed into the edge has been used by W. G. Pye & Co., Ltd., to rotate with the centrifuge rotor. This varies the reluctance at each revolution of a magnetic circuit consisting of a permanent magnet with fine wire coils wound round laminated pole-pieces. The voltage pulses produced at the terminals of the coils at each revolution are amplified and fed into a phonic motor provided with a counting disc.

A novel type of tachometry has been employed by W. Vinten, Ltd., in connection with special motion picture cameras designed for the photographing of high-speed mechanism. A high-voltage electric spark, controlled by means of a tuning fork which operates the contact supplying current to the high-voltage coil, is photographed on the edge of the film just above the picture " gate." As the speed of travel of the film through the camera and the frequency of the spark are known, the number of appearances of the spark in so many frames gives the exact speed at which the pictures were taken. This ingenious method has proved to be of considerable value in the photography of bullets passing through objects, valve bounce in internal combustion engines, and so on.

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**Institution Proceedings** (*Concluded from opposite page*)

must be accompanied by compulsory wiring regulations and control over those persons calling themselves electricians or electrical engineers. The E.R.A. is at present considering the matter of conduit joint conductivity at the instance of the Home Office, and its conclusions should not be long delayed, but there seems little hope of a compulsory scheme in any other direction.

The author holds the view that the possibilities of all forms of earthing associated with the operation of overload protective devices by means of heavy leakage currents over doubtful and uninsulated conductors have been so thoroughly investigated without material improvement that attention should now be directed towards alternative methods which eliminate most of the objections enumerated. The most efficient method yet evolved, in that it limits leakage voltages in the logical manner, is the use of devices responsive to predetermined values. Equally important, an instant check of the effectiveness of the protective system can be made by the user, without skill or the employment of expensive instruments, and at any time.

In describing a method of leakage-voltage protection the author draws upon experience obtained during his association with the important Rheinisch-Westfaelische Elektrizitätswerk (R.W.E.) of Essen. The engineers of the company, notably Dr. O. Lobl, Direktor Heinisch, and the late chief engineer, A. Riedl, had devoted some years to the study of leakage protective problems, following large extensions into rural areas commenced about 1910, and the methods described by Mr. Gilbert are now applied throughout the company's area.

The use of the Heinisch-Riedl devices has now extended beyond the R.W.E. areas to most parts of Germany and, to a great extent, into Switzerland, Holland and Scandinavia. This headway has been made against almost universal protective multiple earthing, a step now taking place throughout Australia and in some parts of South Africa. A compulsory change-over was enforced by the military authorities in Germany in 1936 for all cavalry barracks, and similar action was taken by the dairy controlling body in conference at Kiel in 1937.

# INSTITUTION PROCEEDINGS

## Wartime Street Lighting. Voltage-operated Earth Leakage Devices

### Alleviating the Blackout

A PAPER on wartime street lighting and aids to movement in streets, described as a study of fundamental requirements prepared for the Joint Committee of the Ministry of Home Security and the ILLUMINATING ENGINEERING SOCIETY, was presented to the Society in London on December 10th. The endeavour was to indicate how knowledge of the behaviour of the human eye at very low levels of illumination (under 0.002 ft.-candle) could be advantageously utilised to facilitate " twilight vision," being an effort to satisfy the needs of " the man in the street " during the night in wartime. Eye adaption to darkness was gained slowly and very quickly destroyed by momentary exposure to a flash of light, or quite brief gaze at a surface of normal brightness; in twilight objects were not perceived directly, but " out of the tail of the eye "; outlines were less clear, objects appearing as masses of less clearly defined limits; colours were not distinguishable.

Visual sensitivity depended on the observance of the principles underlying the above-mentioned effects. Thus even weak general illumination helped to avoid excessive contrast. At normal illumination (say, 0.5 ft.-candle) objects within the direct range of vision should not exceed 5 candles per sq. in. in brightness and the variation of their brightness should not exceed 100 to 1. Applying this rule as a first approximation to " twilight " areas (with a background not brighter than the street) would mean a limiting brightness of 0.0002 candle per sq. in., roughly corresponding to 0.1 equivalent ft.-candle. But adoption of the 100 to 1 ratio would reduce this to one-fifth, namely, 0.02 ft.-candle.

A closely related factor was the association of size and brightness; larger objects appeared to be brighter than smaller ones, which enhanced their visibility. Normally the eye detected a difference of one or two per cent. difference in brightness, but it was doubtful whether 20 or 30 per cent. change could be noticed with certainty in twilight. Therefore for objects to be visible in the street at a certain distance the angle subtended at the eye should be well outside 3 deg.; it should contrast relatively highly with its background and, at the same time, avoid depressing vision by being the cause of excessive contrast approaching glare.

#### Limiting Sign Brightness

From the principles outlined it followed that the utility of illumination of the order of 0.0002 ft.-candle depended entirely upon the avoidance of factors liable to depress visual sensitivity. Thus light traps should have a secondary function of causing lingering transition, allowing time for adaptation. The use of " brightness meters " (now specified in B.S./A.R.P. 30) should help to keep the brightness of illuminated display signs and similar objects in streets within 0.05 to 0.1 ft.-candle, especially as these limits had been independently determined with a view to restricting conspicuousness from the air.

It was suggested, as alternatives to vehicle rear lamps, that concealed light under the body of the car (showing its breadth by silhouette) or light applied indirectly to the back surfaces of cars might be explored with a view to diminishing the liability to glare.

Notwithstanding the values specified in the Restrictions on Lighting Order No. 74, 1940, street refuge and obstruction illumination frequently offended in respect of glare, making it difficult to distinguish the outlines of adjacent objects; likewise the torches used by pedestrians were found to possess great drawbacks.

The selection of materials of greater reflective power might sometimes achieve results as good as if ten times the illumination on a relatively dark material were provided: for example, white paint applied with discretion at busy crossings, to the vertical surfaces of kerbs, on tree trunks, walls and railings, and occasionally to the outlines of entrances to buildings which acted as land marks. Contrasts in brightness also created a sense of perspective, on which vehicle drivers relied in order to judge their positions relatively to distant vehicles. Completely even illumination was not sufficient; at high speed along a roadway so lighted one was liable to lose all sense of speed and position. It was only the recognition of objects passed at the roadside that preserved this sense.

There could be no question but that the measure of illumination provided by wartime street lighting, though so small, was of appreciable benefit, especially when applied on a large scale. It afforded a ground work on which the eye could build up impressions from any extra casual light it might receive, much more successfully than if they occurred in total darkness.

It would, however, add to amenities in the streets if somewhat higher illuminations, under proper control, or suitably screened, could be adopted locally in certain instances. Although the aid obtainable from the contrast was substantial, there were limits to the possible gain. The darkest material likely to be available would hardly reflect less light than 5 per cent., and the lightest, such as white paint, not more than about 80 per cent. In so far, therefore, as one relied on difference in reflecting power to produce contrast the maximum possible ratio in brightness was about 15 : 1. If the ratio was increased beyond these limits, as, for example, by using self-luminous objects (such as signs illuminated within), a further gain in visibility was possible—expecially for the more distant objects.

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### Earth-leakage Protection

VOLTAGE-OPERATED means of protection against earth leakage are discussed in a paper by Mr. T. C. Gilbert which has been released by the INSTITUTION OF ELECTRICAL ENGINEERS. In this the author advances the view that the subject needs to be considered upon a more practical basis, necessitating some departure from the present practice of almost purely academic treatment. Piecemeal consideration of separate sections results in obscuration of the question, as efficient protection entails the perfect functioning of each component of the whole scheme. It is declared that in the search for immunity from shock the equally important need for protection against fire risks has been overlooked.

**Mr. T. C. Gilbert is an authority on earth-leakage protection and has contributed a number of articles on the subject to this journal**

The stage has been reached at which the increasing expense and decreasing security of earthing has led to some consideration of alternatives, notably multiple neutral earthing, with the connection of the consumer's casings to the neutral line, and the use of earth-leakage circuit-breakers. The rural area now represents the field of greatest difficulty combined with greatest urgency in the matter of protective questions, but the author discusses protective problems as a whole. The view is advanced that the only logical way to limit leakage voltages is by means of devices responsive to predetermined voltage limits, such as are now employed in the largest rural areas in Europe.

The problems are examined in as simple a manner as possible, without recourse to complicated mathematical formulae or very involved calculations because the divergence between theory and practice is more marked in earthing problems than in any other aspect of engineering practice, and the problems are not therefore amenable to calculation or paper consideration.

If ordinary earthing and protective multiple earthing are to continue to hold the field, in spite of their clearly-established disadvantages, heavy cost, and liability to cause fire, then some improvement in the electrical and mechanical characteristics of the common wiring systems is essential, with proportionate increase in cost.

It is generally complained that installation costs are already too high and, further, to be effective, any such improvement

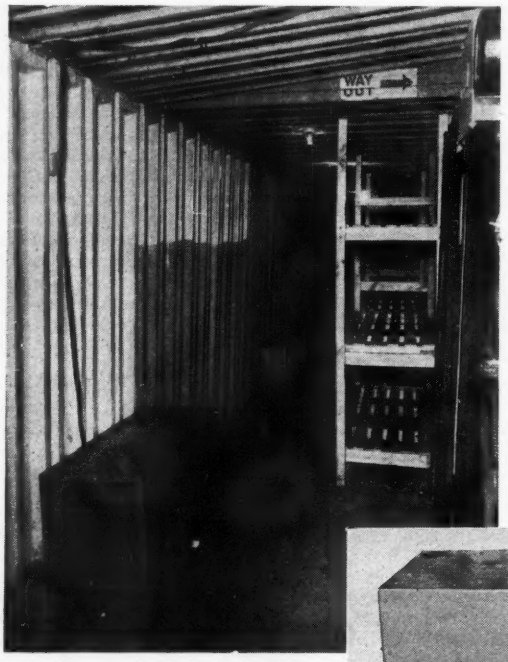
(*Concluded on opposite page*)

# SHELTER HEATING

## Satisfactory Results of Experiments at Hornsey

THE cold and damp of winter have brought in their train a serious problem in the heating and ventilation of public air-raid shelters. Although committees have been set up to inquire into the question and numerous experiments have been carried out, no completely satisfactory solution has hitherto been devised or generally adopted. If the health of those who sleep in the shelters night after night is not to be seriously impaired during the remainder of the winter, in which no doubt worse weather conditions are to be expected, the problem must be tackled without delay.

As we have already declared many times, electricity is likely to provide the only solution. Gas, coal, coke, paraffin, etc., all have the disadvantage that they consume oxygen which the users of the shelters require to breathe, and also emit dangerous or poisonous fumes. For this reason alone we were particularly surprised to hear of the recent Government proposal to install coal fires in shelters. Quite apart from the health side of the question, however, providing them is likely to prove a most expensive and inconvenient matter, involving, among other things, the building of flues and chimneys (often high ones) and the provision of coal storage bunkers (suitably situated to avoid pilfering), together with men to attend to the fires and remove the ashes.



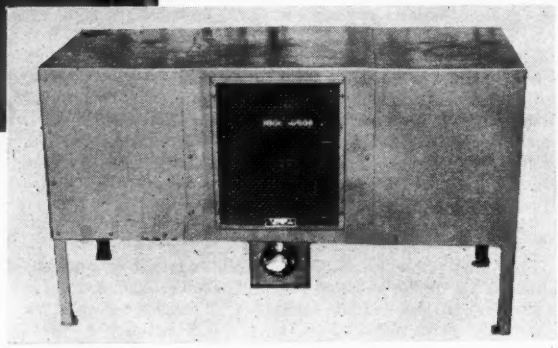

**The Hornsey shelter heating apparatus**

Several ways and means of solving the problem electrically have been tried with varying degrees of success by electricity undertakings all over the country. The method most generally favoured involves the use of low-temperature tubular heaters but these have the disadvantage of providing too localised a heat and of being somewhat costly for the larger shelters. A more promising solution (failing, of course, the provision of air-conditioning apparatus which is, unfortunately, too elaborate and expensive for the purpose) appears to lie in some sort of combined fan-heater apparatus. Such an apparatus, devised by the borough electrical engineer and manager of Hornsey, Mr. F. C. Orchard, is operating with very satisfactory results and has been attracting a good deal of attention, not only among other electricity undertakings but also among M.P.'s and Ministry of Home Security officials.

Mr. Orchard does not claim that the equipment is the complete answer to the problem, but it certainly does help considerably. The trench type shelter in which he has carried out his experiments is probably the most awkward and unpromising one he could have chosen. It has four trenches in the form of a rectangle with a spur or sap leading from one of the shorter arms. The two entrances are in the middle of one of the shorter trenches and near the far end of one of the longer arms, emergency exits being provided at opposite corners of the rectangle and at the end of the spur. Before the shelter was "treated" it was the usual thing for its habitués to come equipped with mackintoshes and umbrellas. The first stage in rendering it more habitable consisted in ensuring that no surface water could soak through the soil above: this was done by providing a tarmac covering over the whole extent of the shelter. Even when this was done, there still remained condensation difficulties and the chilliness of the atmosphere.

To deal with this Mr. Orchard asked the Hotpoint Electric Appliance Co., Ltd., to construct a fan-heater device measuring approximately 3 ft. 6 in. by 14 in. square and embodying a ¼-HP motor mounted in the centre with an extended armature shaft carrying two sets of fan blades, one at each end. This is placed opposite the entrance in the longer trench referred to and the air is sucked in at front and back through two grilles, one of which has a deodoriser pad incorporated. A baffle mounted on the motor directs the air through banks of five 600-W tubular elements at each end before discharging it into the shelter. The fans provide an air flow of 2,000 cu. ft. a minute, giving more than five air changes an hour in the shelter concerned which, incidentally, can sleep 160 persons. The velocity of the air is sufficient to cause the elements to operate at almost black heat with the result that there is practically no vitiation of the atmosphere.

Three-heat switching is provided and it is generally found sufficient to have the full heat on only about 2½ hours (starting from half an hour before dusk). After a further two hours only one-third heat is necessary to maintain the temperature for the rest of the night. The temperature rise recorded some days ago was between 17 and 4 deg. F. above ambient, according to the position in the trench, quite sufficient to remove all condensation and to raise the temperature to a comfortable level. To ensure efficient operation of the system it is essential that the covers of the emergency exits should be open, this necessitating the provision of light traps above them in the form of pieces of curved corrugated iron sheeting.



Comments of users of the shelter indicate that they no longer get "shelter heads" and they do not become so tired, and Miss Ellen Wilkinson, Parliamentary Secretary to the Ministry of Home Security, who visited it a few days ago, confessed that it was the first shelter she would care to spend a night in. At any rate, so satisfied with the results is the Hornsey Borough Council, that it is proposing to install similar apparatus in all the fifty-four shelters in the borough as soon as possible.

The apparatus has the advantage not only of being simple, self-contained, easily operated and requiring practically no attention, but also of being quickly assembled and installed. As soon as the necessary permits for the components are forthcoming Mr. Orchard expects to be able to have all the shelters in the borough equipped within a month. From the point of view of economy of materials it is interesting to note that for the whole of the fifty-four heaters required, less than three tons of metal are needed.

# FIRE RISKS

## Some New Aspects in regard to Electrical Plant

By F. H. Sharpe, B.Sc., M.I.E.E.

IN peacetime the serious effects of fire in electric power stations and substations were realised and much attention was paid to this subject. Articles which have appeared in this journal, papers delivered and discussed before the Institution of Electrical Engineers* and the Electrical Power Engineers' Association,† and the findings of the Electrical Research Association following the recommendations of the Fire Risks Investigating Committee appointed by the Electricity Commissioners,‡ have shown close agreement on points of principle, while still leaving room for individual opinion as to the relative merits of particular methods of fighting fires.

Now that fires are so much more to be expected as a result of enemy action, it is opportune to review the position to see how far the measures taken in peacetime, with or without the possibility of air-raid damage in mind, have been successful and, further, to investigate to what extent changes in practice are dictated, or at least indicated, by the events of the last few months. While, at the moment, disclosure of details is not permissible, useful comment may nevertheless be made. Consideration of the problem perforce requires introduction of the air-raid precautions aspect and much overlapping on to this subject, although these notes do not purport to deal with more than the fire risk.

*Arrangements for minimising fire damage and after-results, particularly so far as enemy action is concerned, are reviewed. The training of power station staffs in fire-fighting methods is also dealt with by the author*

It is perhaps obvious that precautions to mitigate the effect of damage from aerial or other enemy action require to be taken on a more extensive scale than if fire alone is the enemy. This being so it is safe to say that any major steps in this direction will also reduce the effects of fire. The guiding rules, previously advocated, still hold good and may again be enunciated: (1) Segregation and separation of duplicate items of plant. (2) Sound design and construction from beginning to end of the installation, since prevention is better than cure. (3) Immediate interruption of the feed of electrical energy to the faulty plant. (4) Limitation of oil spread by adequate sealing of apertures, and provision of drainage spaces close to the plant. (5) Ready facilities for fire fighting, reserve water supplies and ready access to the site. (6) Organisation.

### Segregation and Separation

First, and foremost by a big margin, is the need for segregation, which, to be fully effective, should be accompanied by separation. This is no new principle and those who have so disposed their plant that supply may be maintained even with major damage to some section now reap the benefit. Segregation by spacing and walls is a sound principle for any item of electrical apparatus but, for outdoor plant, walls are nowadays insufficient and over transformers, for example, some roof screen is most desirable. If considerations of heat dissipation preclude complete enclosure, at least a robust close-mesh wire netting screen can be provided to catch falling splinters and the comparatively harmless small incendiary tube bomb. Until free oil is released, transformers and switchgear are comparatively immune from fire from external sources so that puncture of the tank and, more particularly, the thinner radiator walls, must be guarded against. Complete roofing, with eaves ventilation, is preferable as protection against the "oil bomb." Experience shows that well-built brick walls have surprising powers of resistance to bomb fragments and are much to be preferred to say plain steel barriers.

In switchgear layout the use of sectioned busbars separately housed—and, better still, physically spaced well apart from each other—is imperative. No rule can be laid down as to the degree of spacing necessary, for so much depends on the physical limitations of the site area available. It is, however, most important to divide the apparatus into two or more distinct substations, placing less important plant between the more vital items when space is limited. Even if some of the intervening area is apparently wasted the temptation to use it for electrical stores should be resisted since such stores usually constitute a real fire risk.

The more robust construction representative of modern practice, in particular the use of switches of adequate rupturing capacity proved by test and preferably of low oil content, offers a greater factor of safety than is realised. It is unfortunate that in spite of the extensive research carried out on switchgear in recent years, prices remain high. Perhaps the challenge of the oil-less circuit-breaker and improvements in high-rupturing-capacity fuses will affect the position. Experience suggests that external agency is probably more likely to initiate a fire than electrical failure in the plant itself following mechanical damage unless, of course, prolonged arcing is permitted. Good design calls for isolation of tripping, protective and other control cables from those for their duplicate main feeder and their mechanical protection and suitable routing in the building to ensure that whatever happens control and, in particular, switch tripping supplies are not lost. It is obvious that item 2 embraces all headings, for sound design and construction is the cumulative result of attention to numerous details.

Although in modern warfare high-explosive and incendiary bombs are usually employed together, the effect of the latter, at least in the early stages, should be reasonably localised. It would be unfortunate, therefore, if arcing from faulty or damaged plant were permitted to initiate separate fires, or support those started externally; it is imperative to interrupt fault current.

Rapid expansion of all networks has led to the need for reliable and discriminative protective equipment to reduce system disturbance, but many older systems, and it is feared a few more modern, are inadequately provided with means for rapidly isolating faulty plant. It is essential, as a fire preventative, to do this. The protective systems available are legion and mostly well proven, but the need for ensuring clearance of the remote end of a feeder is sometimes overlooked. Where pilot inter-tripping is not feasible other means are available.

Buchholz or gas relay protectors for transformers in particular have come to stay, and their use is to be commended. Bus-zone protective systems which have been proved in service are now available and can be advocated for major installations where cost becomes a less heavy item in the total expenditure. In spite of the attention paid to providing means for interrupting fault current it must be admitted that failure to do this still occurs, due to insufficient attention to points which, while they appear to be details, are in reality fundamentals. As an example, tripping sources should be duplicated if practicable, but in any case the circuits therefrom should *not* be lightly fused and should be run in ring form with isolating links. Mechanical protection throughout the run of cable is essential.

### Overload Relay Settings

A problem introduced by the varying conditions of plant operation and load interchange during wartime is the difficulty of choosing overload-relay settings which will not cause inadvertent operation under heavy load transfers, while nevertheless permitting operation, when for reasons of security the generating plant on the system may be kept to a minimum. In the turbine room means must be available for cutting off steam supply from the prime mover without delay, and essential cables associated with generators and turbines should be routed and protected to achieve the highest possible degree of security against mechanical damage. This aspect of retaining control of plant cannot be stressed too strongly.

Disposal of oil requires even more careful thought since elaborate pipe drainage systems are likely to be fractured, even underground, particularly if of cast-iron. The ideal transformer enclosure will therefore have a maximum area and

* "Fire Precautions in Major Electrical Stations." *Journal I.E.E.*, 1937, Vol. 81, page 289.

† "Fire Risks and their Elimination." *E.P.E.A. Journal*, April, 1937,

‡ "Fire-fighting Equipment for Electrical Installations." *Journal I.E.E.*, 1939, Vol. 85, page 719.

depth of chippings, or large rubble, to receive and quench the lost oil, and should allow also for water used in fire fighting. Occasional loosening to avoid packing is necessary.

In the generating station itself the problem is severe since it is not easy to confine the spread of oil from damaged lubricating pipes. A little can be done by baffles, etc., but this is where sound design is perhaps of greatest importance in so locating pipe runs as to provide natural protection, and in avoiding adjoining inflammable construction, particularly in the main building, such as the roof.

The findings of the E.R.A. and the discussion thereon at the various centres of the I.E.E. are too recent to justify much reference to alternative means of fighting fires. More point is now lent to the views of those who fear that high-pressure water-spray systems may lose their effectiveness due to damage to the comparatively weak pipe lines, nozzles, etc., and a case can probably be made for duplicating essentials so that the loss of some parts will not completely nullify the effectiveness of the sprays. Loss of water through damaged pipes, etc., does, however, point to the need for increasing the size of water storage tanks, since what is lost in efficiency of application can sometimes be made up by quantity.

### Resistance of Buildings

Where major damage to structures and enclosures results from very heavy explosions the proprietary fixed installations, of whatever type, all appear liable to fail, and the water reserve for use by station personnel or brigades, with or without foam, has to be relied upon. Water was the first fire-fighting agent and, if sufficient is available, will still put out most fires. Nevertheless, it has been remarked that the resistance to damage, even against direct hits, by all except the heavier bombs, of soundly-built steel-framed brick or concrete buildings is surprising. If, therefore, windows or other apertures are suitably screened, fixed installations may be expected still to function if the damage is not major. In this case the foam and gas systems appear to have some advantage over those relying on finely-divided sprays directed at chosen points.

The use of high-pressure water spray has been well proved as a most effective way of extinguishing transformer oil fires, but unless storage tanks are available, or at least booster pumps on the mains, the water pressure and, in fact, quantity available, may well be inadequate when most needed. Should enemy action have been the cause of fire, not only the plant in question but also that in its vicinity may be expected to require major repair, in which case prevention of oil spread, the result of direct hose action, is perhaps of less importance *provided there is plenty of water* to ensure final extinction. Since most major centres are nowadays manned, there seems much to be said in favour of buried pipework with protected stand pipes to which spray, foam or normal branches, may be connected.

In view of the likelihood of roads or access ways being obstructed by débris, alternative approaches to the site should be agreed beforehand with the fire brigades, who should also be enabled to familiarise themselves with the various alternative and reserve water supplies. Hydrants owned by the undertaking should be suitable to receive brigade equipment. The advantages of respirators have already been proved and a number of the type supplying oxygen should be available to facilitate entry into enclosed spaces charged with $CO_2$ or methyl bromide and the products of combustion. Emergency lighting, particularly in tunnels, etc., is desirable, and here, installations of the "Pyrotenax" type have already proved their robustness.

### Organisation and Initiative

Organisation is invaluable in any branch of industry. "Hit it hard and hit it quickly" is a useful maxim in fire fighting, and this entails sound organisation. There must be regular rehearsals to ensure that disciplined familiarity with the job which is most able to stand up to the stress of circumstances. Every man should know what action is expected of him and in each group there should be a leaven of men able to show initiative when communications are interrupted.

A problem which is perhaps even more acute to-day, and on which there is difference of opinion, is whether to delay release of the water, foam, $CO_2$, or methyl bromide until it can be ascertained that there are no operators remaining in the possible danger area. While special circumstances such as inaccessible cable tunnels or basements may require different treatment, rarely is there justification for prolonged delay. If the men are not injured or trapped they should be little less impeded in making an immediate retreat by the fire-fighting medium than by the heat and rapidly-growing volume of smoke which invariably accompany an electrical fire. If their exit is hampered by débris or injury, their rescue is likely to be earlier if the fire has been rapidly quenched or its spread at least arrested, since the helpers will have oxygen masks.

It is, however, essential that the control centre should at all times be aware of the number of people and their situations in, say, a large switch-house. Further, the people themselves should be familiar with all normal and emergency exits. No hard and fast rule may be laid down; probably the best solution is a combined smoke and heat detection system, the former to give both remote and local alarm, the latter arranged to release the fire-fighting devices automatically with even more peremptory local alarm. In any case, of course, local or remote hand release by the control engineer at his discretion is necessary. A suggestion which is worth investigating, in spite of the severe practical complications, is the possibility of sequential release, the discharge commencing first at the seat of the fire.

The foregoing may be summarised in the general statement that in the past year there has been no startling development in the general problem of dealing with the fire risk. Rather has there been intensification of application, attention to detail, duplication and segregation of plant, greater mechanical protection afforded to plant, a general robustness of construction, and improved organisation. It may even be that by the study of the subject that is forced upon it the industry will derive lasting benefit.

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## Timing Catapult Speeds

FOR testing the speed of operation of an aeroplane catapult an electric timer has been evolved by the General Electric Co. of America as a substitute for the method of shooting barrels from a ship's deck. The indicator includes two coils fixed 1 ft. apart in the catapult at the end of the run. A permanent magnet is mounted in the skid, which is shot down

**Speed indicator for ships' catapults, including power unit, permanent magnet and coils**

the catapult, and induces voltage impulses in the coils as it passes over them causing the skid speed to be registered on an instrument, the needle of which remains deflected until released by a push button.

The indicator responds to the discharge of a capacitor, the voltage of which is held constant by a rheostat in the primary of the charging transformer. Measurement is of the time interval between the voltage impulses and the pick-up coils. Any short-time intervals which can be co-ordinated with impulses of this type are said to be measurable. An accuracy within $\pm$ 2 per cent. is claimed. If the proper speed is registered, a plane can be placed on the skid and shot off with the correct adjustment of the compressed air mechanism. As there is no mechanical connection between the skid and the speed indicating equipment the operation of the catapult cannot be affected.

# CORRESPONDENCE

*Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions.*

## Lighting Terminology

I HAVE to thank Mr. Long for his reply to my previous letter. Referring to my comment on the figure of 70 per cent. mentioned in Mr. Long's original paragraph on "Uniformity Ratio" and bearing in mind the standards set by B.S.S.398, I am more inclined to agree with the figure quoted in the article "Factory Lighting" in your issue dated October 25th last.

I note with interest that in connection with "Diffusion" the worst possible conditions should be taken, though these may occur over only a short period of time. It is pleasing that the suggestion for the use of the symbol "S" is not of Mr. Long's making. The list of British Standard Engineering Symbols and Abbreviations gives for area either the small italic "*a*" or the large block "A" and it appears a retrograde step for one section of the engineering profession to desire to depart from these. The definitions which have been quoted are set out in B.S.S.233 as follows :—

| *Term* | *Definition* |
|---|---|
| Efficiency. | Of a luminous source. The ratio of the total luminous flux emitted to the total power consumed. In the case of an electric lamp it is expressed in lumens per watt. In the case of a source depending on combustion it may be expressed in lumens per thermal unit per unit of time. |
| Angle of cut off. | Of a fitting, shade or reflector. The largest angle below the horizontal at which the light source is invisible when viewed from a point outside the reflector. |

I leave your readers to interpret these.

Birmingham, *December 14th.* H. G. BATSON.

## The Electrical Salesman's Future

As one of the many hundreds of electrical salesmen at present serving in the fighting forces I am a little worried about our future when the war is finally won. We frequently read in the ELECTRICAL REVIEW of the way women are playing an increasingly important part in our great industry, and when we return home on leave we see many new female faces in the showrooms and sales departments. Most of us have heard how in the last war women replaced men in gas showrooms, and how when the war was over women continued to remain supreme in the sales department, and we are wondering whether this is going to happen in our own industry.

We all realise that women must play their part in this war by doing our work, but for the past few years women have gradually found their way into various positions on the sales side of supply undertakings, large numbers of young women have attended domestic science schools to be trained as showroom assistants and demonstrators, and the war has been a golden opportunity for these young ladies, enabling them to land jobs—our jobs. It is obvious that large numbers of women are being trained for a limited number of jobs, and because the war has increased the number of sales jobs available, we feel there is a danger of a surplus of female sales assistants in the very near future.

Of course, the whole crux of the problem is the smaller salaries offered to female assistants. If female sales assistants are to be paid the same salary as that offered to males, we have nothing to worry about, as it is a poor salesman who cannot prove his worth in comparison with the opposite sex.

In addition to the question of our jobs being available, we cannot help wondering whether our services are likely to be so valuable. Thousands of electric cookers must have already been destroyed, and as few are at present being manufactured, there will probably be a demand for electric cookers and other electrical appliances which exceeds the supply. On the other hand with so much rebuilding to be carried out, we may have a stern fight with the gas men to ensure that as many of the new buildings as practicable are all-electric. Again we have heard of the various efforts to control our industry and eliminate the existing healthy competition with the gas industry, which will at the same time eliminate us.

It therefore seems that there is much to make us think about the future, and it behoves us to have at least one other string to our bow. We believe that after the war, supply undertakings will get into the habit of appointing specialists to deal with the various branches of development work. One branch which obviously has a tremendous future is water heating. Each undertaking of any size will undoubtedly employ at least one water heating engineer, and many will employ several. Thus many of us while in the Services can make a careful study of this important subject, and return ready for the strong tussle we will undoubtedly have ensuring that the buildings of the future use electricity for water heating. The ladies will look after the cooker development work, and we shall have difficulty in keeping them from obtaining some of the jobs in showrooms, but they will probably leave us alone in the various specialist fields.

Refrigeration is another specialist job which should offer splendid prospects, and it is a subject which one can study in one's spare time. Air conditioning will probably become a very important feature of the rebuilding programme after the war, and this is yet another specialist branch of our industry. Then there are countless other appliances which could be dealt with by the specialist—heating, especially tubular and panel heating; washing machines; food preparing machinery; lighting; and large industrial and domestic installations.

The obvious thing for us to do, therefore, is to improve our knowledge as much as possible, dealing with one specialist branch at a time. The time is coming when electrical salesmen will have to be electrical sales engineers, and the time is also coming when many managers of supply undertakings will be drawn from the ranks of electrical sales engineers. I know from my own personal experience—I am in the Navy—how difficult it is to get down to a little serious study, though most of us have the time available, but it is obvious that we shall have to make a start or we shall be left out in the cold when the war is won. The trade papers, especially the ELECTRICAL REVIEW, are a tremendous blessing to those in the Forces; they serve as a very important link, keeping us in touch with new developments, and refreshing our technical knowledge with short articles. Most undertakings have spare copies of the various trade papers available and they would be doing a real service to their employees on active service by sending them trade papers regularly. We like to keep in touch.

*December 17th.* A.C.J.

## Cinema Auditoria Acoustics

INVESTIGATIONS made in an endeavour to discover the reasons for the differences between performances in the reproduction of sound by identical equipment installed in apparently similar cinema theatres are outlined by Messrs. C. A. Mason and J. Moir (British Thomson-Houston Co., Ltd.) in a paper released by the INSTITUTION OF ELECTRICAL ENGINEERS. Details are included of frequency characteristics and reverberation times and the requirements of good auditorium design are set out. Sound levels picked up by means of a microphone and high speed level recorder are illustrated by oscillograms.

It is explained that past attempts to improve sound reproduction from films have been directed principally towards improving the frequency response and volume range of the sound equipment and to correcting the reverberation time of the auditoria in order to achieve an agreed optimum rate of decay of the sound. In recent years there has been a growing conviction that other factors may be of major importance. The investigations emphasise the care necessary in the detail design of the auditorium and in the correct location of the loud-speakers to avoid long-path reflections and the importance of instantaneous sound measurements in obtaining overall performance characteristics of the equipment and hall.

The authors feel that no apology is necessary for presenting to electrical engineers the results of an investigation containing many acoustical problems, because in their opinion further improvement in sound equipment and particularly in loud-speaker design is impossible without a thorough appreciation of the effects of the hall in which the apparatus has to be installed.

# MANUFACTURERS' POLICIES

## Co-operation with the Wholesalers

### By "Sala"

THE manufacturer distributing his goods through electrical wholesalers is sometimes confronted with the problem :— Are the actual consumers of my goods the customers of the wholesaler or are they really my customers ? In pondering over this difficult subject it should become apparent to the manufacturer that all consumers of his product should be classed as his own customers. He obviously realises and appreciates the vital part which the wholesaler plays in the distribution of the goods—a part which he, the manufacturer, could not play without considerably increasing his distributing costs and consequently his selling price—but he cannot get away from the fact that his connection with the users of his product must be maintained either directly or indirectly if sales are to continue.

In his own interests the manufacturer must decide what form this connection should take. He may decide that his own representatives should pay periodical visits to industrial users of his product and give all the technical assistance and advice they can. Alternatively, he might favour the adoption of some scheme of postal assistance in the form of periodical bulletins describing the uses and properties of his manufactures, or he may decide that such helpful literature should be distributed through the wholesalers handling his product.

*Wholesalers, who have to deal with the products of many manufacturers, cannot be expected to devote too much time to any one of them. It is the manufacturer's job to keep in touch with ultimate customers if he wishes to retain them, and also to work definitely with the wholesaler or without him*

It is suggested that the direct method of contact is desirable and, in fact, essential if the manufacturer and his customers are to benefit by any scheme of education or advice which has as its ultimate object the maintaining of the demand for the manufacturer's product. The difficulty of making contact with every small industrial user whose business is handled through a local wholesaler is obviously the first difficulty. The wholesaler does not consider it right that he should have to provide the manufacturer with a list of his customers and is inclined to suspect that there is some ulterior motive behind such a request. He will probably tell the manufacturer that he is prepared to allow his own salesmen to take the manufacturer's technical men to certain customers or potential customers and whilst such an arrangement is reasonable it does not adequately satisfy the manufacturer.

### Large and Small Customers

The wholesaler is most interested in maintaining the business of his largest buyers, and these are the type of customers to whom he would take the manufacturer's representative. It has been proved to be often the case that the expenses incurred in paying too much attention and in making too frequent and unnecessary calls on large buyers is out of all proportion to the profits obtained.

It may be argued that it would be impossible for the manufacturer's technical men to visit all of the many small users of his product whose purchases are made through wholesalers, but it is just as important that these small users shall be educated and cultivated to become possible larger buyers as it is for the larger users to be encouraged to become permanent customers. The creation and maintenance of the manufacturer's goodwill justifies the expense of technical representatives making direct contact with all industrial users of his product. His visits need not be anything like so frequent as those necessarily made by the wholesalers' salesmen, but even infrequent visits will be of valuable help to the manufacturer in ascertaining if his product is still being used and, if not, what advantages of a competitor's product—in price, quality or other particulars—have tempted the buyer to change.

The manufacturer may consider that it is up to his wholesaler distributors to advise him of any "customer mortality" due to competitors' price-cutting or quality advantages, but there are few wholesalers with an office organisation sufficient to provide up-to-date information on this subject. The manufacturer must depend for this information on the reports of the periodical visits of his own technical representatives to user customers.

Their territories and the intervals between their visits must be arranged so as to enable them to call upon all users and prospective users whether or not it is known that the manufacturer's product is in use. If it is, then the customer will usually be glad to avail himself of the offers of advice and suggestions which the technical representative can give him. If it is not, the technical representative starts on his selling job. The record of these visits is the most valuable information that the manufacturer can obtain. It is priceless in the way that it gives him the reaction to his product of the actual user; it informs him who are the users of his product and who are the prospective users; it enables his technical representatives to break down any prejudices which may exist amongst potential customers and to do a thorough job of introduction and salesmanship, referring all orders to conveniently situated wholesalers.

The manufacturer may remark that all this is work which he expects to be done by the wholesalers who distribute his product. Such a remark shows clearly his short-sightedness and his lack of understanding of the wholesaler's function. It also points to his failure to realise that in his own interests he must take his fair share of expense in creating goodwill and cultivating and maintaining a demand for his product—a thing which he cannot expect the wholesaler to do for him.

Designs change, products are improved and the wholesalers stock the products which are in most general demand. It follows, therefore, that without that direct contact with his customers the manufacturer could be left high and dry, with no markets for his product, if his wholesaler distributors decided that a competitor's product was in greater demand. The sole reason why this situation exists is that manufacturers will not state their policies. Instead of declaring openly that their products are sold only through wholesalers they prefer, for some unknown reason, to leave the matter in doubt. They refer some business to local wholesalers but decide to take other business direct with the result that they never have the full confidence of the wholesaler and, in consequence, never gain his full support. The wholesaler stocks their products because he is asked for them, but if the demand declines he is not going to go to the trouble and expense of finding out why the demand has declined. He rightfully claims that it is the manufacturers' responsibility to ensure that the demands for their products are maintained.

### Definite Decision Essential

How else, then, can the manufacturer maintain the demands for his product ? The manufacturer has two questions, therefore, for which he must provide definite answers. The first is that which has already been discussed : that of keeping in direct contact with users of his product. The second is the policy he intends to adopt in distributing his goods. If he decides that it is necessary for stocks of his product to be placed at vital distribution centres all over the country and that the wholesaler method of distribution will best enable him to achieve this object, then he must be prepared to adhere strictly to a wholesaler policy and not be tempted to accept direct business.

By formulating and strictly maintaining such a policy the manufacturer also safeguards himself. There have been numerous examples of wholesalers refusing to divulge the manufacturer's name to users of his product who wished to approach the manufacturer solely to obtain technical information which the wholesaler obviously could not be expected to give. Such lack of co-operation is only to be expected if the manufacturer is lax in his policies. The wholesaler is not solely the manufacturer's salesman and representative, he is the stockist and distributor of the manufacturer's goods, and it must not be forgotten that his existence depends on adequately stocking and distributing the products of a number of manufacturers and, therefore, he cannot be expected to give his whole time and energies to the sale of one particular product.

# COMMERCIAL and INDUSTRIAL NEWS

## Supply Legislation. Aid in Works Management. Electrical Travellers' Meeting.

### Parliamentary Bills

THE following electricity authorities have presented Bills, which will be introduced in Parliament during the forthcoming session :—

KENT ELECTRIC POWER CO.—A Bill to amalgamate the undertakings of the South East Kent Electric Power Co., Ltd., and the West Kent Electric Co., Ltd., with the undertakings of the Kent Electric Power Co., Ltd., to confer further powers on the Kent Electric Power Co., and for other purposes.

MID-SOUTHERN UTILITY CO.—A Bill to authorise the company to raise additional capital; to confer further powers; and for other purposes.

CARDIFF CORPORATION.—A Bill to confer further powers in respect of the electricity undertaking; and for other purposes.

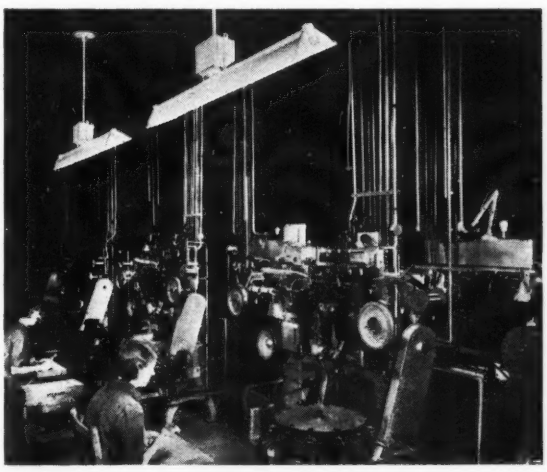
Notices relating to the above applications appear in the *London Gazette* for December 6th and 10th.

### A Machine-Driving Booklet

Newman Motors have issued a novel little booklet, prepared in a similar form to a car driver's licence, in which a good deal of useful statistical information is given, showing the approximate horsepower required to drive various classes of machinery, full load current (approx.) of motors, v.i.r. cable sizes, wiring capacity of conduits and approximate running costs per hour of 50-cycle, 3-phase motors.

### Works Fluorescent Lighting Installation

The accompanying illustration shows an example of the use of 80-W fluorescent discharge lighting for intricate work. This installation of Royal "Ediswan" tubes installed experimentally in the Edison Swan Company's Ponders End works wire welding bay so altered the aspect that it remains



**Fluorescent lighting in a lamp works**

now a permanent feature. These machines weld the four sections of a lamp filament lead-in into one continuous wire.

### Industrial Welfare

The advent of the war has rendered the work of the Industrial Welfare Society of even greater importance than before. Its annual report just published outlines, among other things, a few of the many new problems on which it has been able to give information and service, such as recreation in face of the black-out, transport difficulties, requisitioning of buildings, the economic limits of weekly hours, the organisation of night work, allowances to employees serving in the Forces and the conditions of evacuated staffs.

### Pensions for Directors

In the Chancery Division, on December 16th, Mr. Justice Bennett had before him a petition by Simmonds & Stokes, Ltd., electrical engineers, for the sanction of the Court to the confirmation of an alteration of its objects.

Mr. Gedge, for the company, said that the company was desirous of extending the objects to the payment of pensions to persons who had been directors. The business had been built up by the three directors and it was desired to have power to grant them pensions.

His Lordship confirmed the alteration.

### Identifying Enemy Aircraft

A new identification chart of German aircraft, suitable for hanging, has been prepared by *Flight*. The new chart, which is printed on a card measuring 22 in. x 14½ in. includes one or two new types of aircraft, and incorporates improvements introduced as a result of the use of many thousands of earlier editions of the chart all over the country and throughout the services. The price is 1s., plus 6d. for postage for single copies. Postage on two or more copies up to six is 8d. and for twelve copies 11d. The charts are obtainable from the Flight Publishing Co. Ltd., Dorset House, Stamford Street, London, S.E.1.

### Industrial Psychology

The annual report of the National Institute of Industrial Psychology shows that the early months of this year were shadowed by uncertainty. The outbreak of war affected its vocational guidance and educational work and in the first few months of the adaptation of industry to war production there was little opportunity for industrial investigations. With the new year, however, the position became clearer and brighter. An increasing number of firms turned to the Institute for advice on problems greatly intensified by the war, such as recruitment and training of staff, re-training operatives on new tasks, hours of work, the introduction of rest pauses and working conditions in the "black-out." In dealing with these the experience accumulated by the Institute in twenty years of practical work is now being recognised and the Institute has in fact had difficulty in dealing with all the requests for advice received.

### A.S.E.E. Meeting Cancelled

Owing to the inability of Mr. F. S. Naylor to give his lecture on "Wartime Temporary Expedients," and in view of the existing circumstances, the meeting of the Association of Supervising Electrical Engineers on January 21st, at the Lighting Service Bureau has been cancelled.

### G.E.C. Overseas Display Aid

The Argentine organisation of The General Electric Co., Ltd., obviously believes in the

**G.E.C. lamp showcard for use in Argentina**

feminine appeal in selling. The attractive four-colour counter showcard illustrated is one of a series of display aids for G.E.C. lamps, and with its clear price marking is sure to prove a practical sales aid.

### Electrical Commercial Travellers

The Electrical Trades Commercial Travellers' Association held its annual meeting at Magnet House, Kingsway, London, W.C.2 on December 6th, when Mr. P. E. Wheatland, who occupied the chair, said that the activities of the Association had been fully maintained during the year The membership remained practically the same, and he stressed that every effort should be made to increase it. During the year several members had been assisted in securing fresh employment, and only two calls had been made on the benevolent fund. One grant had been made from the death benefit fund. The financial position was sound. Invested funds now totalled over £1,000, an increase of £250 on the previous year. Grants of 25 guineas each had been allocated to the Royal Commercial Travellers' Schools and the Electrical Industries Benevolent Association, while a grant had also been made to the Commercial Travellers' Benevolent Institution. Reference was made to the success of the luncheon held last February and it was decided that every endeavour would be made to hold a similar function in February, 1941.

Mr. T. W. Heather, the president of the Association, commenting on the report, said that the past year had not been an easy one, but he was sure they were all imbued with the thought that, so far as lay in their power, they would do everything possible to ensure the continuance of the Association. He commended the Association's charitable activities and, after paying a tribute to the officers, touched on the question of membership. This would, no doubt, continue to worry them, he said, but he was confident that if they kept the Association on the

same footing as they had for many years, then they had no cause to concern themselves unduly. He thanked the members for inviting him to continue as president of the Association for another year—an invitation which he was pleased to accept. He also intimated that he intended personally to send a Christmas parcel to the twenty members of the Association who were serving with the Forces. The annual report and statement of accounts were approved, and the meeting unanimously re-elected all the officers for a second year.

### Stockton Salaries Dispute

A dispute has arisen between the Stockton-on-Tees Town Council and the Electrical Power Engineers' Association regarding the salaries of two members of the staff of the Council's electricity undertaking. The Association suggested that the salaries of the men concerned should be £534 and £345 per annum. It was reported to the Council that the salaries at present were £474 15s. and £240 respectively. The Council decided to inform the Association that the men concerned had already been dealt with regarding cost-of-living increases, etc. in the same manner as other members of the Corporation's staff. The matter has been referred to the Industrial Relations Department of the Ministry of Labour with a view to reaching a settlement.

### Fatalities

Two boys, John and Frederick Gallagher, aged eight and seven years respectively, received fatal electric shocks at Saltcoats on December 6th. They had been playing at the back of their home when an overhead electric cable passing over the street fell and the boys apparently caught hold of it.

An inquest was held at Belfast on December 10th into the death of Robert McCready, an electrical engineer employed by the Belfast Corporation. The deceased man was found lying on the floor of a substation having sustained shock and burns. It was evident that he had come into contact with exposed "live" gear. A verdict of accidental death was returned and a representative of the Corporation expressed regret at the loss of one who, he said, would have risen high in the service.

### Reduction of Canadian Duties

The *Board of Trade Journal* refers to the War Exchange Conservation Bill introduced into the Canadian House of Commons on December 2nd, and gives a list of goods of British origin on which import duties have been reduced or suspended. The following classes are included, the preferential duty being reduced from 15 to 10 per cent.:—Electric dynamos or generators and transformers, and complete parts thereof; electric motors and complete parts; and electrical apparatus and complete parts, not otherwise provided for.

### Modified Slow Butt-Welder

In the note on this machine which appeared in our last issue (p. 166) it was stated that the rotary current selector switch had five different current settings. Actually there are six.

### Trade Announcements

Prat-Daniel (Stanmore), Ltd., Dalston Gardens, Stanmore, Middlesex, will continue the business of makers of fans for various purposes (especially for boiler plants) dust collectors, air heaters, etc., hitherto carried on by Prat-Daniel, Ltd. Owing to circumstances arising out of the international position, it has become necessary to liquidate the latter company. The new company will be entirely British both as regards capital and management.

Howells (Electric Motors), Ltd., have removed their London office to 115, Fore Street, Hertford (telephone: Hertford 844), and their Bristol branch to 66, Gloucester Road, Bristol, 7 (telephone: Bristol 44074).

The Bristol branch of the Wholesale Fittings Co., Ltd., is now at 53 Frogmore St., Bristol, 1. Manufacturers are asked to send catalogues to this address.

### New Catalogues and Lists

**R. F. Winder, Ltd.,** Belgrave Electrical Works, Leeds, 2.—"Electrical Surplus," Vol. 13, No. 56, December 1940, post free, priced register of new and secondhand machines and equipment surplus to owners' requirements.

**British Insulated Cables, Ltd.,** Prescot, Lancashire. — Illustrated catalogue (N.S.M. 1–9 and N.S.M.G. 1–5) descriptive of cables and accessories for collieries; also coloured folder (M. 114) illustrating fused cut outs in moulded insulating cases.

### Calendars

The calendar received from Warsop Petrol Drill & Tools, Ltd., shows the current, preceding and following months and is surmounted by an effective picture of a three-masted vessel, entitled "Cargoes," from the painting by Sam J. M. Brown.

The calendar of the Thames Wire & Cable Co., Ltd., has monthly sheets which also show the preceding and following months. In addition it has a daily block calendar.

We wish to thank the many readers who have sent us the season's greetings, which we heartily reciprocate.

## INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

PIONEER toaster.

TRUFLEX-D bimetal strip.

# Costing Government Contracts

## I. C. Engine Makers' Scheme

WE reported in our last issue that the Internal Combustion Engine Manufacturers' Association, 32, Victoria Street, London, S.W.1, had produced a scheme of cost investigation in agreement with the heads of the costing branches of the Admiralty, the Ministry of Supply and the Air Ministry, acting on behalf of the Contracts Co-ordinating Committee. Some further details of the scheme, which, it is stated, is capable of extension to contracts other than those for i.c. engines, may be of interest.

Costing data is to be given to Government supply departments only in cases where actual costs are required by the contracts, and not for standard products unless the departments have grounds for doubting the reasonableness of the price. It is hoped that the effect of this will be that costing data will only be required for products of which there is no general source of supply (*e.g.*, new products made specially to Government design) and for standard products only in the special circumstances mentioned.

Members' financial and cost accounts will be available to the cost investigators for scrutiny or "spot" check of individual costs if required, but no member shall be asked to alter his present costing methods. But if he can, without inconvenience, conform in material matters to methods indicated in pro-forma statements scheduled to the scheme he will do so.

Copies of statements relating to unit costs for each order; audited annual balance sheets and accounts analysed in a manner specified; recovery of overcosts; and the basis of preparation of costs are to be furnished to the Government Departments concerned and to the Association's auditors. Forms for this purpose are included in the scheme.

The Government supply departments will require to satisfy themselves that the basis of preparation of costs adopted by each member is reasonable, but they will not ask for a change in basis, unless they consider there is a fundamental error in principle which causes in the aggregate incorrect costs. It is recognised that to ask for anything like a uniform system of costing for all the diverse businesses of members would be difficult. On a few points, however, it is desirable for Members of the Association to make as great an effort as practicable under present conditions to deal with items on the same basis. These points are:—

(*a*) Direct materials should be charged at actual costs including carriage inwards. The term "Actual Cost" is deemed to include any system of average costs using up the earliest purchases first. This means that the Government supply departments take the benefit of any favourable purchase of stocks which a member may have made, but conversely, if prices fall, the Government supply departments will pay the actual costs incurred.

(*b*) Direct labour should, wherever possible, be limited to operatives' wages only. Foremen and supervision should be charged to overhead expenses.

(*c*) Works overhead charges can most conveniently be considered as a percentage of direct labour. Thus for the purposes of comparison between one member and another it is very important, wherever possible, to classify the same things as direct labour and to limit such direct labour charges to operatives' wages only. Some members may have complicated systems of applying works overheads by machine rates, but it should be sufficient, however these rates are applied in detail, if the resulting application is expressed in total as a percentage of direct labour.

(*d*) Wherever practicable commercial and selling charges should be expressed as a percentage of total works cost. In general, all commercial and selling expenses should be allowed as a charge, although in certain special cases, such as where a member incurs an undue amount of advertising and selling expenses in respect of certain standard products, none of which is required by Government Departments, the Departments will naturally expect some part or all of this expense to be excluded. Further, there are certain items which no doubt are already dealt with by members in their annual accounts as special items and are not included in either schedules of works or of administration and selling charges, but if they are included they will have to be eliminated for purposes of Government costs. Examples of such items are given.

# ELECTRICITY SUPPLY

## Ripple Control for Nelson and Walsall. Revision of Bulk Supply Terms

**Bedford.**—LOANS.—The Corporation Electricity Committee has obtained sanction to borrow £1,650 for substation, £7,295 for mains and £7,220 for plant.

BATH AND LAUNDRY EQUIPMENT.—The Corporation Evacuation Committee, which is to provide communal baths and laundry in Batts Ford, has considered estimates for installing hot water apparatus, etc., and for heating and drying by electricity, gas and steam, and is of opinion that electric water heating and drying is not only the most satisfactory method but is cheaper than either of the two other methods. It therefore recommends the provision of the requisite electrical apparatus at an estimated cost of £150.

**Bognor Regis.**—INCREASE IN CHARGES.—The Bognor Gas & Electricity Co. is increasing the price of both gas and electricity by 20 per cent.

**Cheltenham.** — DOMESTIC APPLIANCE DECISIONS.—In view of increased cost of water heaters and labour, the Corporation Electricity Committee has increased hiring rates from 3s. to 4s. 6d. a quarter for the 1½-gall. size and from 7s. 6d. to 11s. for the 20-gall. models. Also as it is now impossible to purchase aluminium kettles, and copper kettles, when obtainable, are more expensive, the committee has decided to withdraw the free issue of a kettle with each hired electric cooker.

**Colchester.** — FIRE PRECAUTIONS. — The Electricity Committee has received sanction to the borrowing of £2,283 for the provision of automatic fire protection apparatus at the generating station.

At a meeting of the Town Council the borough treasurer reported the amount estimated to be expended on the following unspecified works during the financial year to September 30th, 1941: Domestic apparatus, £4,000; substation equipment, £2,000. It was resolved to recommend application for sanction to borrow these amounts.

**Crewe.**—DISTRIBUTION SCHEME.—The Town Council is applying for sanction to borrow £5,275 for an electricity distribution scheme on the Totty's Hall Estate.

SUPPLY TO CORPORATION HOUSING ESTATE.—The Town Council has approved a scheme prepared by the electrical engineer for the supply of electricity to Corporation houses on the Totty's Hall estate at a cost of £5,275 and is applying for sanction to borrow this amount.

**Croydon.** — COMMUNAL KITCHENS. — The Corporation Emergency Committee is to establish communal kitchens and recommends that Mr. Rendell Baker, chief engineer and manager of the Electricity Department, who is already supervising the provision of refreshments in public shelters, shall be the principal officer responsible for the scheme.

**Exmouth.**—AGREEMENTS TO BE TERMINATED.—The East Devon Electricity Co. has given notice to consumers that the existing two-part tariff agreements are to be terminated. Upon inquiry by the Town Council the company stated that it was not its present intention to increase the standing charges but new agreements enabling this to be done if necessary would be entered into.

**Fareham.**—INCREASE IN CHARGES.—As from the December meter readings charges for electricity are to be increased as follows: "Unit" charge of the two-part domestic and maximum demand tariffs, from ¼d. to ⅜d.; lighting, from 5½d. to 6d. per kWh; heating, cooking and small power, from 1¼d. to 1⅜d. per kWh.

**Fleetwood.**—HIGHER PRICES.—For the third time since the war began, Fleetwood electricity consumers are to pay increased prices. The Finance Committee has decided that users of less than 10,000 kWh. a quarter must pay a 5 per cent. increase from this month. Over this figure consumers will pay a similar amount, plus an increase graded on the price of coal. Thus the total increase in charges during the war period now amounts to 15 per cent. Increased wages and dearer coal are chief factors in the increase. It was stated that up to last December coal was costing 17s. 4d. per ton. Now the average price is 22s. 2d. It was expected to rise to between 25s. and 30s. in the near future.

BULK SUPPLY CONTRACT DECISION—To secure more favourable terms the Corporation is giving notice terminating the arrangements for bulk supplies of electricity from the Central Electricity Board, to become operative in twelve months' time. The Corporation states that it will accept grid prices and conditions.

**Great Yarmouth.**—YEAR'S WORKING.—For the first time since 1919 the accounts of the Corporation Electricity Department (engineer and general manager: Mr. P. E. Rycroft) show a deficit (£2,700); in 1938-39 there was surplus of £10,403. Although the revenue at £201,715 shows an increase of £5,945, the total expenditure (£204,413) rose by the still larger figure of £19,047, the most important increases being £13,764 in generation charges, £7,098 in capital charges, and £1,283 for A.R.P. The increased cost of fuel amounted to approximately £3,000. Against these increases the only outstanding reduction in expenditure related to income tax, which was £3,785 lower. Although charges for electricity were increased at the beginning of January, the average price received per kWh sold fell from 1.011d. to 1.009d. Total sales of electricity advanced from 40,960,813 to 42,341,676 kWh and it is an interesting fact that while the consumption declined by nearly 3 per cent. within the borough, it rose by almost 31 per cent. in the rural areas. The number of consumers increased from 30,958 to 31,156.

**Hereford.** — CABLE-LAYING. — The Highways Committee has raised no objection to the proposal of the S.W.S. Electricity Power Co. to lay an underground cable in Commercial Road.

**Inverness.**—FAILURES OF SUPPLY.—At a recent meeting the Electricity Committee had under consideration a letter from the electrical engineer and manager in which he stated that the partial bulk supply from the Grampian Electricity Supply Co. was far from satisfactory, and that during the period from October 24th until November 13th there had been three complete failures, but that, luckily, there was no "black-out" as he had taken the precautionary measure of having stand-by plant in service: the manager had made representations to the area engineer of the company who had advised him that all the interruptions were due to faults over which he had no control. The Provost explained that the permanent source had not been connected up yet, but that as soon as his had been done he hoped that conditions would improve. The manager is to report on the change over to AC and the probable cost.

**London.**—ISLINGTON.—Although the sales of electricity declined from 61 million to 56 million kWh, the total revenue of the Borough Electricity Department (electrical engineer: Mr. A. P. MacAlister) last year amounted to £393,342, only £7,211 less than in 1938-1939, while there was still a net profit of £4,275, as against £19,223. The average price obtained per kWh sold for all private purposes rose from 1.58d. to 1.63d.

**Middleton.** — EXTENSIONS. — The Electricity Committee is to extend the supply to works at Rhodes. Sanction is being sought to a loan of £3,000 for substation equipment.

**Morley.**—CHANGE-OVER.—Application is being made by the Electricity Committee for sanction to borrow £4,000 for a further section of the change-over system.

**Motherwell.**—STREET LIGHTING.—The Corporation Watching and Lighting Committee is considering the extension of the modified form of street lighting to cover approximately 700 lamps at street junctions. The cost would be about £700, and the clerk has been instructed to inquire into the question of borrowing the necessary money.

**Nelson.**—RIPPLE CONTROL.—The Electricity Committee is to have ripple control apparatus for giving air-raid warning installed at the electricity works, at an estimated cost of £2,000, and tenders are to be invited.

**Newcastle-on-Tyne.**—ANNUAL REPORT.—The annual report of the City Council's electricity undertaking shows a surplus of £3,908, as compared with £2,126 in the previous year. The total income was £72,056 (£77,112) and working expenses £66,679 (£72,618), leaving a gross surplus of £5,377 (£4,493). Interest, redemption and other charges amounted to £1,469, leaving a surplus of £3,908. Total sales of electricity amounted to 18,985,213 kWh.

**Peterborough.**—NEW MAIN FEEDER.—The Corporation is to provide an alternative electricity main to factory premises, at a cost of £3,000.

**Preston.**—HIRE-PURCHASE.—The Electricity Committee has obtained sanction to the borrowing of £22,500, for the purpose of financing hire-purchase transactions.

**Richmond (Yorks.).**—PROPOSED CO-ORDINATION OF DEPARTMENTS.—At a recent meeting of the Town Council notice of motion was given by Councillor A. J. Durston urging the co-ordination of the gas and electricity undertakings. The Councillor said that the Council "could not afford to have competition to the detriment of the ratepayers."

**Scarborough.**—LOAN SANCTIONED.—The Town Council has received sanction from the Electricity Commissioners to borrow £1,500 for consumers' apparatus.

**Stockton-on-Tees.**—BULK SUPPLY CHARGES.—The borough electrical engineer has reported to the Town Council on a conference of local authorities held at Darlington to consider the charges made by the North Eastern Electric Power Co. for electricity supplied to small undertakings. A report presented by Messrs. Kennedy and Donkin, consulting engineers, recommended that negotiations with the Power Co. should continue in an effort to obtain a reduction in the fixed charges. It was suggested that the Company should be

asked to afford supplies to all undertakings at the grid tariff and, if this request was rejected, the consulting engineers should prepare a case for submission to the Electricity Commissioners for determination under Clause 12 of the 1936 Act. The Stockton electrical engineer informed the Town Council that neither Stockton nor Middlesbrough had voted on this resolution as both towns were committed to a policy of approaching the Electricity Commissioners for determination whether the remainder of the undertakings agreed or not.

**Stoke-on-Trent.**—LOAN APPLICATIONS.—Application is being made to the Electricity Commissioners for sanction to borrow £10,000 for the provision of general mains and services; £2,500 for meters; and £1,750 for substation equipment.

**Tunbridge Wells.**—SUBSTATION GEAR.—The Town Council is seeking sanction to borrow £2,600 for substation switchgear and transformers.

**Walsall.**—RIPPLE CONTROL.—The Electricity Committee is to install a ripple control system at a cost of £2,500.

**Warrington.**—SUCCESSFUL YEAR.—Despite the war, the Corporation Electricity Department had a very satisfactory record of operation during the year ended March 31st last. In his annual report the borough electrical engineer, Mr. Norman T. Smith, states that the output increased from 58 million to 71 million kWh, with a corresponding increase of from £247,341 to £276,582 in the total revenue. Although working expenses were £24,343 higher at £213,101, the gross profit advanced from £58,583 to £63,480, the net profit (£21,919) being £1,561 above that for the preceding year. A sum of £4,062 is contributed towards the relief of the rates, as compared with £4,392 in 1938-39. New consumers numbered 1,339, bringing the total to 30,286 and representing an increase of 10,951 kW.

**Worthing.**—PRICE INCREASES.—The Town Council has approved the following increases in charges to operate from January 1st:—Lighting flat rate 6d. per kWh (7.2d. outside the borough), with increases for other purposes. Two part tariff: rateable value charge raised to 15 per cent. and the running charge from ½d. to 0.6d. per kWh, with a slightly higher percentage on running charges outside the borough. The chairman of the Electricity Committee said that the deficit for the current year on the present basis was estimated at £29,000. He said that considerable economies had been effected but they had no control over bulk-supply charges.

## TRANSPORT

**Newcastle-on-Tyne.**—SUCCESS OF TROLLEY BUSES.—For the year ended March 31st last, the City Council's tram service showed a deficit of £5,528 and the trolley buses a surplus of £51,758. The income from the trams was £268,888 as against £308,962 in the previous year, and expenses were £245,264 (£265,764). Interest, redemption and other charges totalled £29,152, leaving a deficit of £5,528 against a surplus of £4,127 the year before. Miles operated by the trams amounted to 3,883,473 compared with 4,383,515 the year before, while the number of passengers carried was 50,033,247, nearly 8,000,000 fewer than in the year before. Working costs per mile increased from 14.551d. to 15.157d. Income from the trolley buses amounted to £243,177 (£223,272) and working expenses to £161,613 (£137,263). The net surplus of £51,758 compared with £65,318 for the previous year. Operating costs per mile increased by 0.887d. to 12.381d. Miles operated were 3,132,619 (2,866,165) and passengers carried 42,295,414 (39,281,180). Further trolley vehicle powers were obtained during the year by the granting of a Provisional Order for operation on the Elswick Road and Clayton Street routes with extensions in the Denton Burn area. Owing to the war the work could not proceed except by the consent of the Ministry of Transport.

**New Zealand.**—TRAMWAYS IN 1939-40.—The *New Zealand Electrical Journal* states that the 1939-40 statistics of electric tramways again record an increase in the number of passengers carried — from 144,262,336 in 1938-39 to 149,736,195 in 1939-40, a percentage increase of 3.8. All centres, except Dunedin and New Plymouth reported increases in passenger traffic. Wellington, which had the advantage of the Centennial Exhibition for five months of the 1939-40 fiscal year, showed the largest increase (4,201,000). Auckland following with 1,155,000. The increases for Christchurch, Invercargill and Wanganui were 173,000, 96,000, and 55,000 respectively. The decrease in Dunedin was 179,000 and in New Plymouth 28,000.

Expenditure for 1939-40 amounted to £1,596,682, and revenue to £1,593,737, revealing a deficit of £2,945. The undertakings which recorded an excess of revenue over expenditure were Auckland, Wellington, and Dunedin. The net amount expended on capital outlay during the year 1939-40 was £97,109, making the total expenditure to date £5,786,487. Accrued funds and reserves now total £3,361,163.

# UNITED STATES ELECTRICAL EXPORTS

## Progress in First Half of 1940

DURING the first half of 1940 there was an increase of about 20 per cent., compared with the corresponding period of 1939, in the electrical exports of the United States. The total value recorded for this period was $58,020,000 against $49,099,100.

| | Half year to June 1940 $000 | Inc. or dec. on 1st half 1939 $000 |
|---|---|---|
| Generators, DC | 256 | + 67 |
| Generators, AC | 1,132 | + 635 |
| Steam turbine generator sets, under 500 kW | 29 | — 10 |
| Ditto, 500 kW and larger | 335 | + 197 |
| Accessories and parts for generators | 562 | + 208 |
| Motor-generator welding sets | 568 | + 197 |
| Non-rotating welding sets | 291 | + 216 |
| Self-contained lighting sets | 670 | — 73 |
| Wind-driven generators | 228 | + 5 |
| 6 & 12-V storage batteries | 960 | + 113 |
| Other storage batteries | 291 | — 19 |
| No. 6 dry-cell batteries | 81 | + 4 |
| Flashlight batteries | 1,824 | + 588 |
| Batteries, dry, multiple cell, except flashlight | 93 | * |
| Other dry and wet cell primary batteries | 108 | * |
| Capacitors, 0.5 kVA and larger | 58 | + 34 |
| Power transformers, over 500 kVA | 266 | + 223 |
| Distribution transformers, 500 kVA and less | 490 | + 200 |
| Instrument transformers | 59 | + 1 |
| Other transformers | 371 | + 173 |
| Mercury power rectifiers | 9 | + 1 |
| Rotating convertors under 300 kVA | 162 | + 27 |
| Ditto, 300 kVA and larger | 231 | + 163 |
| Complete battery chargers non-rotating | 118 | — 5 |
| Feeder voltage regulators | 52 | + 21 |
| Switchboard panels, except telephone | 360 | — 15 |
| Oil circuit-breakers and switches | 185 | + 106 |
| Power switches, and circuit-breakers over 10 A | 678 | — 140 |
| Fuses | 95 | — 6 |
| Watt-hour and other measuring meters | 431 | + 131 |

The recovery spread through most of the leading groups, notably radio apparatus, the majority of power plant, flashlight batteries (probably to the United Kingdom), searchlights and airport beacons (probably for purposes of the war). The only important decreases were in household washing machines, refrigerators and vacuum cleaners.

The accompanying table, which has been extracted from the official returns issued in Washington, gives the values for the first six months of 1940 with a note of increases or decreases on the first half of 1939.

| | Half year to June 1940 $000 | Inc. or dec. on 1st half 1939 $000 |
|---|---|---|
| Electrical indicating instruments | 347 | — 2 |
| Electrical recording instruments | 134 | — 13 |
| Other electrical testing apparatus and parts | 844 | + 215 |
| Lightning arrestors, choke coils, reactors and parts | 243 | + 16 |
| Motors, ¾ HP and under | 383 | + 21 |
| Ditto, over ¾ and under 1 HP | 175 | + 23 |
| Stationary motors, 1-200 HP | 1,364 | + 649 |
| Ditto, over 200 HP | 468 | + 202 |
| Railway motors | 71 | + 68 |
| Electric locomotives, railway, mining and industrial | 444 | + 250 |
| Electric industrial trucks and tractors | 253 | + 108 |
| Starting and controlling equipment for industrial motors, and parts | 1,232 | + 587 |
| Ditto for electric railway and vehicle motors, and parts | 71 | + 20 |
| Accessories and parts for motors | 1,165 | + 478 |
| Portable electric tools | 715 | + 10 |
| Household refrigerators | 4,587 | — 722 |
| Commercial refrigerators up to 1 ton | 739 | — 306 |
| Parts for electric refrigerators | 2,661 | — 706 |
| Flashlight cases | 331 | — 42 |
| Electric fans | 293 | — 40 |
| Lamps for automobiles, flashlight and Xmas trees | 476 | + 309 |
| Other metal filament lamps | 580 | + 130 |
| Other electric lamps | 74 | + 22 |
| Searchlight and airport beacons | 927 | + 900 |
| Floodlights | 72 | + 9 |
| Household washing machines | 714 | — 527 |
| Household washing machine parts | 131 | + 48 |
| Domestic vacuum cleaners | 105 | — 120 |
| Domestic vacuum cleaner parts | 176 | + 38 |
| Other domestic motor-driven devices | 194 | — 166 |

| | Half year to June 1940 $000 | Inc. or dec. on 1st half 1939 $000 |
|---|---|---|
| Electric flat-irons | 101 | — 28 |
| Electric cooking ranges | 205 | + 52 |
| Other domestic electric heating or cooking devices and utensils | 406 | + 91 |
| Electric melting furnaces and parts | 154 | — 309 |
| Heat-treating furnaces and parts | 258 | — 47 |
| Other industrial heating devices and parts | 251 | + 26 |
| X-ray tubes | 227 | + 45 |
| Other X-ray apparatus and parts | 794 | + 46 |
| Other therapeutic apparatus and parts | 185 | — 37 |
| Radio transmitting sets, tubes and parts | 1,627 | + 620 |
| Receiving sets | 4,734 | + 48 |
| Radio receiving valves | 1,398 | + 57 |
| Receiving set components | 2,790 | + 583 |
| Loud speakers | 212 | — 88 |
| Other receiving set accessories | 298 | + 48 |
| Telegraph apparatus and parts | 154 | + 37 |
| Telephone instruments | 113 | + 35 |
| Other telephone equipment | 1,807 | + 211 |
| Bells, buzzers and alarms | 194 | + 61 |
| Starting, lighting and ignition equipment | 552 | — 2 |
| Insulating material | 275 | + 103 |
| Rigid metal conduit | 317 | + 56 |
| Other metal conduit, outlet and switch boxes | 282 | + 62 |
| Sockets, outlets, fuse blocks, lighting switches and parts | 954 | + 291 |
| Lighting fixtures and parts, interior | 837 | + 264 |
| Ditto, exterior | 203 | + 106 |
| Other wiring supplies and line material | 585 | + 56 |
| Electric razors | 79 | — 438 |
| Other electrical apparatus | 7,036 | + 2,110 |

* Comparable figures not available.

# NEW PATENTS

## Electrical Specifications Recently Published

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

### 1939

6181. "Electrical oscillating system." Board of Trustees of the Leland Stanford Junior University. March 1st, 1938. (529771.)

8588. "Wireless apparatus for the simultaneous reception of a plurality of signals." M. Wallace. March 17th, 1938. (Addition to 525,393.) (529712.)

9317. "Joints for electric power cables." Standard Telephones & Cables, Ltd., T. R. Scott, J. K. Webb, J. A. Leno and N. Woodhouse. March 24th, 1939. (Cognate application 18361/39.) (529903.)

11767. "Gas-turbine plants." Akt.-Ges. Brown, Boveri and Cie. April 20th, 1938. (529714.)

12126. "Electron-discharge devices employing secondary emission." Kolster-Brandes, Ltd., D. S. B. Shannon and P. K. Chatterjea. April 22nd, 1939. (529837.)

12132. "Telecommunication exchange system." Standard Telephones & Cables, Ltd., and G. E. Peters. April 22nd, 1939. (529718.)

13327. "Electric relays for polyphase currents." A. Reyrolle & Co., Ltd., H. Leyburn, J. A. W. Mills, A. F. B. Young and G. G. Smail. May 4th, 1939. (529905.)

14939. "Method of producing electrical, thermal or acoustic insulating material from glass." V. Scraka and B. Weiner. May 21st, 1938. (529725.)

15061. "Dynamo-electric machines." British Thomson-Houston Co., Ltd. May 10th, 1938. (529727.)

15198. "Direct current generators." Wilson Welder and Metals Co., Inc. August 25th, 1938. (529639.)

15248. "Telephone systems." R. Mercer (Associated Telephone & Telegraph Co.) May 22nd, 1939. (529644.)

15361. "Methods of generating pulses characteristic of sound and like waves." Kolster-Brandes, Ltd., and W. A. Beatty. May 24th, 1939 (Addition to 523575.) (529648.)

15362. "Electric communication cables." Standard Telephones & Cables, Ltd., J. F. Morley and D. Nunn. May 24th. 1939. (529649.)

15363. "Electric signalling systems." Standard Telephones & Cables, Ltd. (M. den Hertzog and A. C. Berden). May 24th, 1939. (529650.)

15364. "Electric motors of the vibrating armature type." Kolster-Brandes, Ltd., and C. N. Smyth. May 24th, 1939. (529651.)

15365. "Electric signalling systems." Kolster-Brandes, Ltd., and W. A. Beatty. May 24th, 1939. (Addition to 524671.) (529652.)

15464. "Suction cleaners." Hoover, Ltd. June 20th, 1938. (529657.)

15475. "Television transmitting and like cathode-ray tubes." Marconi's Wireless Telegraph Co., Ltd. June 15th, 1938. (529777.)

15555. "Liquid-immersed circuit-breakers having arc-extinguishing provision." C. H. Flurscheim and Metropolitan-Vickers Electrical Co., Ltd. May 25th, 1939. (529846.)

15706. "Printing telegraph transmitter apparatus." Marconi's Wireless Telegraph Co., Ltd. May 28th, 1938. (529848.)

15709. "Voice-controlled switching devices for telephone circuits." Standard Telephones & Cables, Ltd., and K. E. Latimer. May 26th, 1939. (529788.)

15710. "Hand nailing tools." Standard Telephones & Cables, Ltd., F. W. May and E. J. Burch. May 26th, 1939. (529789.)

15711. "Synchronising systems for television and the like." Kolster-Brandes, Ltd., and C. N. Smyth. May 26th, 1939. (529790.)

15716. "Manufacture of selenium rectifiers." Westinghouse Brake & Signal Co., Ltd., and L. E. Thompson. May 26th, 1939. (529771.)

15717. "Manufacture of selenium and like rectifiers." Westinghouse Brake & Signal Co., Ltd., and L.E. Thompson. May 26th, 1939. (529792.)

15721. "Method and/or apparatus for effecting automatic control." Birmingham Electric Furnaces, Ltd., G. Kent, Ltd., A. G. Lobley and P. Scanes, Jun. May 26th, 1939. (529906.)

16294. "Methods of and apparatus for guiding trolley-buses." British Thomson-Houston Co., Ltd., and C. J. Milner. June 2nd, 1939. (529915.)

16360. "Temperature control devices." British Thomson-Houston Co., Ltd. June 3rd, 1938. (529741.)

16455. "Non-symmetric reflectors for directional lighting fittings." General Electric Co., Ltd., S. S. Beggs and A. G. Brown. June 5th, 1939. (529743.)

16484. "Electric water heating systems." Zip Heaters, Ltd. June 23rd, 1938.(529662.)

16490. "Charging of electric accumulator batteries by variable-speed dynamos." Akt.-Ges. Brown, Boveri & Cie. June 7th, 1938. (529663.)

16576. "Electric thermal switches for use in railway signal light-repeating and like apparatus." Lamp Mfg. & Railway Supplies, Ltd., and D. H. Minett. June 6th, 1939. (529678.)

16591. "Metal-vapour electric convertors." English Electric Co., Ltd., H. C. Beck and B. M. Murray. June 6th, 1939. (529685.)

16612. "X-ray apparatus." British Thomson-Houston Co., Ltd. June 7th, 1938. (529689.)

16613. "Synthetic resinous compositions and methods of making the same." British Thomson-Houston Co., Ltd. June 8th, 1938. (529690.)

16676. "Refrigerators." H. J. Burden. June 7th, 1939. (529750.)

16707. "Method of controlling and amplifying electric currents by the use of asymetrically conducting layers." H. Rupp. June 7th, 1939. (529754.)

16709. "Limitation of disturbances of receivers for electromagnetic waves." A. Spitz. June 7th, 1939. (529755.)

16716. "Electric thermal switches for automatic fire alarms." Power Flexible Tubing Co., Ltd., and W. G. Laycock. June 7th, 1939. (529757.)

16749. "Radio receivers." British Thomson-Houston Co., Ltd. June 7th, 1938. (529798.)

16750. "Power plants comprising an electric generator driven by a gas turbine." British Thomson-Houston Co., Ltd. June 7th, 1938. (529799.)

16776. "Current collecting arrangements for trolley-pole vehicles." F. Szalay and Inventio Patentverwertungs Akt. Ges. June 8th, 1939. (529802.)

16795. "Electrical systems for the automatic control of variables, for example, temperatures and pressures." Drayton Regulator & Instrument Co., Ltd., and R. V. Grover. June 8th, 1939. (529805.)

16796. "Device for securing in place signalling apparatus of the kind comprising a movable arm and particularly applicable to motor road vehicles." Soc. pour la Fabrication des Projecteurs Electriques Marchal. June 10th, 1938. (529806.)

16800. "Stray-field transformers." General Electric Co., Ltd., and J. Cates. June 8th, 1939. (Cognate applications 17625/39 and 5020/40.) (529807.)

16828. "Electrically-propelled trucks." Ransomes, Sims & Jefferies, Ltd., and H. Mathers. June 8th, 1939. (529814.)

16843. "Coloured electric lamps." E. R. Bonnefoy-Cudraz and E. C. Vandewalle. June 8th, 1939. (529816.)

16888. "Electro-deposition of nickel." Udylite Corporation. June 15th, 1938. (529825.)

16912. "Transformers for use with electrical energy meters." Chamberlain & Hookham, Ltd., and S. James. June 9th, 1939. (529828.)

16913. "Lighting systems." R. R. Hoare. June 9th, 1939. (529830.)

16956. "Wireless heterodyne receiving apparatus." General Electric Co., Ltd., N. R. Bleigh and A. Bloch. June 9th, 1939. (529862.)

16957. "Electric incandescent lamps for operation in series." General Electric Co., Ltd. July 4th, 1938. (529863.)

16958. "Thermionic valve circuits." General Electric Co., Ltd., H. C. Turner and G. M. Tomlin. June 9th, 1939. (529864.)

16968. "Electric room heaters." Clayton Dewandre Co., Ltd., and H. Blomeley. June 9th, 1939. (529865.)

16970. "Pneumatically operable control mechanism." British Thomson-Houston Co., Ltd. (Shibaura Engineering Works, Ltd.) June 9th, 1939. (529866.)

16971. "Electric gas-blast switches." British Thomson-Houston Co., Ltd. June 9th, 1938. (529867.)

16974. "X-ray insulation." Standard Telephones & Cables, Ltd. June 10th, 1938. (529868.)

16975. "Telephone transmitters of the carbon granule type." Standard Telephones & Cables, Ltd. June 18th, 1938. (529869.)

16980. "Metal-covered flexible tubes." F. Devereux. June 9th, 1939. (529870.)

17016. "Temperature-responsive variable reactances." Marconi's Wireless Telegraph Co., Ltd., and G. B. Banks. June 9th, 1939. (529880.)

17017/18. "Multi-grid electron discharge tubes." Marconi's Wireless Telegraph Co., Ltd., and A. J. Young. June 9th, 1939. (529881/2.)

17051. "Electric salt-bath furnaces." F. S. Anderson. June 11th, 1938. (529891.)

17063. "Electric arc lamps." British Thomson-Houston Co., Ltd. June 11th, 1938. (529893.)

17075. "Synchronous motor electric clocks." F. A. Lanfranconi and British Vacuum Cleaner & Engineering Co., Ltd. June 10th, 1939. (529918.)

17076. "Synchronous electric clocks." F. A. Lanfranconi and British Vacuum Cleaner & Engineering Co., Ltd. June 10th, 1939. (529899.)

17119 "Systems for remote indications of meter readings." General Electric Co., Ltd., and F. C. F. Phillips. June 12th, 1939 (529919.)

17123. "Electrical contacts." Akt.-Ges. Brown, Boveri & Cie. June 11th, 1938. (529920.)

# FINANCIAL SECTION

**Reports and Dividends. New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Stocks and Shares**

## Reports and Dividends

**Electric & Musical Industries, Ltd.**—In the course of his speech at last week's annual meeting Mr. Alfred Clark (chairman and managing director) said that all the radio sets which they had been permitted to manufacture had found a ready sale; they had maintained their position in the market and had improved the quality of their goods. They had met with some success in their endeavour to find compensation in other markets for the loss of business on the Continent.

During the year the recession in the company's normal sales had been made up by other work and as a result there was a slight increase in the turnover. Mr. Clark said that he would not speculate as to the future, but there had been an improvement in the results of the operating companies during the July-September period of last year as compared with 1939.

In addition to the radical reorganisation of sales arrangements they had also re-adjusted their factory organisation the better to carry on production in normal times of highly competitive articles and also to meet the unaccustomed demands now being made upon them. Their technical policy was aimed at readiness to enter at once such markets as might be available to them when the war ended.

**Philips' Lamp Factories.**—At a recent general meeting of shareholders held at Willemstad (Curaçao), the chairman stated that the company had large factories in Great Britain, Argentina and Australia and considerable interests in works in British India and New Zealand. Since then a lamp factory had been opened in the Dutch East Indies. As these works were not able fully to cover the demands of the company's selling organisations, orders had to be given to friendly concerns which, owing to the regular exchanges of technical information, were familiar with the company's products.

The meeting approved the request to suspend during the present emergency the submission of the annual accounts and also sanctioned the election of Mr. D. Crena de Jongh as a director.

The general meeting of Philips' Lamps Holding Co., was also held in Willemstad and approved the suspension of submission of accounts and the election of Dr. A. F. Philips as a director.

**The Manaos Tramways & Light Co.**, reports that after allocating £8,000 for renewals and £3,826 for amortisation the net operating profit for the year to April 30th was £6,377. After adding difference in exchange, interest on investments, etc., and deducting London expenses, directors' fees, income tax and debenture redemption, there remains £1,668 available for debenture interest. Payment of 1 per cent. interest (same) on the debentures will be made on December 24th. An additional generating set commenced operation in September last.

**Cape Electric Tramways, Ltd.**—The gross receipts during the year ended June 30th last of the subsidiary companies in Capetown and Port Elizabeth were £727,536 (against £697,148 in 1938-39), and the number of passengers carried rose from 61,472,000 to 64,632,000. The profit amounted to £26,911, as compared with £30,423. The dividend is maintained at 5 per cent. and the balance carried forward is increased from £53,629 to £55,979.

**S. Smith & Sons (Motor Accessories) Ltd.**, report a net profit for 1939-40 of £200,039 as compared with £232,503 for the preceding year. The final preferred ordinary dividend is 14 per cent., making 21 per cent. for the year, and the deferred dividend for the year is 50 per cent. Both these rates are the same as for each of the three preceding years.

**Radio Rentals, Ltd.**—The directors state that owing to difficulties arising from war conditions it will not be possible to complete the preparation and audit of the accounts in time to enable the annual meeting to be held before the end of the year.

**Dictograph Telephones, Ltd.**, state that owing to the exceptional conditions prevailing it will not be possible to complete accounts in respect of the year ended August 31st last until the early part of January.

**The Amazon Telegraph Co., Ltd.**, reports a gross revenue for the year to June 30th of £29,362, as compared with £26,556 for 1938–39. Expenses totalled £26,589, leaving a profit of £2,773. A dividend of 2½ per cent. less tax is paid (against nil) and £3,708 is carried forward (against £4,529 brought in).

**Sydney S. Bird & Sons, Ltd.**, held their annual meeting on December 19th, when the managing director (Mr. S. S. Bird), presiding in the absence on war service of the chairman, Sir Ian Stewart-Richardson, Bt., said that the company was fully employed and the order book was in a healthy condition. The results for the past year had been very satisfactory.

**R. A. Lister & Co., Ltd.**, have again declared a final dividend of 5 per cent. plus a bonus of 6 per cent., maintaining the distribution for the year at 16 per cent.

**The Quebec Power Co.** has declared a quarterly dividend of 25 cents.

**Newman & Watson, Ltd.**, are paying no dividend on the 6 per cent. preference shares due on December 31st.

**The Power Corporation of Canada** is paying an interim dividend of 15 cents per share on the common stock.

**The London Electrical & General Trust** is maintaining its interim dividend at 2 per cent.

**Telephone Rentals, Ltd.**, is again paying an interim dividend of 4 per cent.

## New Companies Registered

**Robinson's Stores, Ltd.**—Private company. Registered November 13th. Capital £500. Objects: To carry on the business of manufacturers of electric, gas and oil lamps, quartz lamps, reflectors, wireless apparatus and accessories, gramophones, bells, fires, stoves, cookers, control gear, fans, irons, dynamos, motors, armatures, insulators, etc. Directors: L. Robinson and Mrs. L. Robinson, both of 91/3, Church Road, N.W.8. Registered office: 245, Oxford Street, W. 1.

**Redcliffe Radio & Engineering Co., Ltd.**—Private company. Registered November 26th. Capital £5,000 in 5,000 shares of £1 each. Objects: To carry on the business of manufacturers of, and dealers in, and repairers and hirers of, electrical and mechanical apparatus and accessories and, in particular, wireless sets, etc. The directors are: R. G. Hawkins, 69, Victoria Street, Bristol 1, and A. Greenhill, Kilowatt House, North Road, Bath. Registered Office: 69, Victoria Street, Bristol, 1.

**R. S. Amplifiers, Ltd.**—Private company. Registered November 22nd. Capital £1,000. Objects: To carry on the business of manufacturers of, and dealers in, amplifiers, musical instruments, gramophones, radio and television apparatus, electrical components, etc. The subscribers are: J. M. Reeves, 14, Langham Street, W. 1., and A. Cohen, 1, Rebecca House, Brokesley Street, Bow, E. 3. Secretary: J. M. Reeves, 14, Langham Street, W. 1.

**J. & T. Spiers, Ltd.**—Private company. Registered December 7th. Capital £1,000. Objects: To carry on the business of electrical, chemical, radiological, surgical, acoustic and general engineers, etc. The directors are: J. Spiers, 5, Crestbrook Place, Palmers Green, N.13, and three others. Registered Office: Bovay Works, Bovay Street, N.17.

**Thompson Adapters.**—Private company. Registered in Edinburgh, December 9th. Capital £2,500. Objects: To carry on the business of electricians, electrical engineers, manufacturers of and dealers in all apparatus required for generating, distributing and supplying electricity, etc. The subscribers are: D. Thomson and D. Thomson, junior, both of 52, Dalry Road, Edinburgh.

**Wireless Trade Service Co. (Plymouth), Ltd.**—Private company. Registered December 9th. Capital, £600 in 600 shares of £1 each. Objects: To carry on the business of manufacturers of and wholesale and retail dealers in radio, electrical and television apparatus and installations, etc. The directors are: Hy. J. M. Maxey, Trevalar, Furzehatt Road, Plymstock, Devon, and Geo. H. Dobbins, 1, Prince Maurice Road, Plymouth, Devon, radio engineer. Secretary: E. C. Tame, 5, Leighton Road, Hartley Vale, Plymouth. Registered office: Central Road, West Hoe, Plymouth.

## Companies' Returns

### Statements of Capital

**Bustler Electric Co. (Birmingham), Ltd.**—Capital, £100 in £1 shares. Return dated June 12th, 1940. 3 shares taken up. £3 paid. Mortgages and charges, nil.

**Electrical Wiring Investment Co., Ltd.**—Capital, £5,000 in £1 shares. Return dated July 31st, 1940. All shares taken up. £5,000 paid. Mortgages and charges, nil.

**Birmingham Home & Office Telephone Co., Ltd.**—Capital, £1,000 in £1 shares. Return dated September 6th, 1940. All shares taken up. £1,000 paid. Mortgages and charges, nil.

**Austin Walters & Son, Ltd.**—Capital, £10,000 in £1 shares. Return dated June 18th, 1940. 5,406 shares taken up. £4,406 paid. £1,000 considered as paid. Mortgages and charges, £3,600.

**Calamco, Ltd.**—Capital, £100 in £1 shares. Return dated June 26th, 1940. All shares taken up. £100 paid. Mortgages and charges, nil.

**Venreco, Ltd.**—Capital, £16,000 in 12,000 cumulative preference and 4,000 ordinary shares of £1. Return dated June 19th, 1940. 8,450 preference and 4,000 ordinary shares taken up. £8,452 paid on 8,450 preference and 2 ordinary shares. £3,998 considered as paid on 3,998 ordinary shares. Mortgages and charges, £10,000.

(*Continued on page* 195)

# STOCKS AND SHARES

TUESDAY EVENING.

THE approach of the Christmas season was accompanied, this year in the Stock Exchange, by a feeling of caution as to invasion possibilities, several authoritative speakers warning this country against a complaisance which events might not justify. These warnings had the effect of laying restraint upon business enterprise, and, with the ordinary end of the year predilection of the investor for window-dressing at his bankers, there has been little expansion in the volume of daily business.

Now that the Treasury has given permission for dealings to take place between residents of Great Britain in certain dollar stocks whose main market has always been in London, striking changes have taken place in quotations. Brazilian Tractions are the most active of the shares in our price lists to be thus released from the Treasury ban. The control price, fixed on June 18th last, was 5½. A few, very few, dealings took place on this basis. Directly dealings became free, on the 16th of this month, the real—as distinct from the previously false—price started at 7½. A fair amount of business is being done in the shares at about 7, the middle price. Settlement of the transactions is hedged around by so many complexities of official procedure that, until the official forms become more familiar, activity in the various shares is not to be expected. The cause of the delay in freeing these dollar stocks from the prohibition against dealing is said to be a legal difficulty in finding a suitable certificate that could be negotiated over here in respect of shares that had been sent by the Bank of England into Canada for safety's sake.

## More Requisitioning

The Treasury has announced its intention of requisitioning a third list of dollar securities held by people in this country, amongst which stocks are a few issued by United States light and power companies. As with the previous requisitions, the proprietors are given no option as to whether they should sell or hold. The Government requires the securities for assistance in making dollar payments to the United States against war material bought in that country. The British holder has to hand them over, and is paid the fair market value based upon the quotations ruling in New York on a specified date. He is asked to put the money into British Government war stocks, and is offered facilities for doing so at no cost, and very little trouble, to himself.

Experience of what happened in the case of the previous requisitioning Orders showed that a large proportion of the money was placed in National Defence and similar issues. Part, however, of the funds received by holders of the requisitioned securities, came into the Stock Exchange markets for employment there. The assumption that this tendency will be repeated is responsible for renewed search amongst high-class industrials that yield a better rate than Government issues offer. Inquiry extends, also, to Central Electricity Board and similar stocks upon which the interest rates are fixed and non-variable.

## Two Debenture Stocks

At 23s. 6d. Edmundsons yield a shade over 5 per cent. on the money. There is £1,500 of the company's 4 per cent. debenture stock on offer in the market at 100½, ex the interest due on the 30th of this month. This pays £3 19s. 6d. per cent. on the money. The stock can be redeemed at 100 after 1950, and, assuming repayment in 1951, the yield at the price quoted will be £3 18s. 9d. per cent. The interest service is covered, on the last published profits, nearly six times over.

Allen West 4½ per cent. first mortgage debenture stock is on offer as to about £1,000 at 94, cum the interest due at the end of next month. To meet the annual interest charge requires £9,811. Last year the company announced profits of £97,000 available to meet it. The flat yield is £4 15s. 9d. per cent. The stock is redeemable by 1968 by purchase up to, or by drawings at, 101. Assuming redemption in 1968, the yield is raised to £4 17s. 9d. per cent.

## Price Fluctuations

Most of the changes in price of the securities quoted are upward. The principal improvement is one of 5s. 6d. in Tube Investments, raising the quotation to 92s. 6d. The demand for the shares has come mainly from the provinces. Although the dividend is not likely to be increased during the war from its present 3¾ per cent., the sound financial condition of the company attracts investment that is satisfied with a 5¼ per cent. yield on the money. The further rise to 2s. 6d. in Jerusalem Electric shares to 20s. is due, of course, to the favourable progress of the war in the Near East.

Amongst cable stocks, Anglo-American preferred has risen a further two points to 99 and the deferred one point to 23½. In the dollar stocks, the rise of 1½ to 7 in Brazilian Traction shares has already been mentioned. In addition to this, Mexican Light & Power first mortgage bonds are marked up 5 to 35. Enfield Cable shares continue their advance, being now at 46s. 3d.

Amongst electricity supply shares, County of London at 32s. are $\frac{1}{16}$ up, and Metropolitans at the same price, have put on 9d. Rises of 6d. each occurred in Yorkshire Electric and Northmet ordinary shares. British Insulated further improved to 82s. 6d. A few sellers of English Electric caused a decline to 28s. 9d. and the recent rise in Murex brought in profit-taking which lowered the price $\frac{1}{16}$ to 77s. 6d. Home Railway stocks show little change. Southern Railway 5 per cent. preference at 82½ is a point down. London Transport "C" holds its previous figure of 33.

## Telephone Properties

One of the many companies whose financial year ends with this month, Telephone Properties, Ltd., is expected to repeat the dividend of 6 per cent. on its ordinary shares paid in each of the last three years. The company's name was changed nine years ago, from Venezuela Telephone & Electrical Apparatus, Ltd., to its present title. Probably the geographical position of the undertaking has something to do with the indifference shown towards its shares by investors, although, in favour of Venezuela, it must be remembered that the country is one of the few without external debt. The gross revenue for 1939 of £102,742 was the best in the company's fifty years' existence, but expenses and taxation lowered the net profit to £37,169, the smallest since 1935.

The issued share capital is divided into £288,528 in 8 per cent. preference units of £1 each, quoted at 24s., and £410,932 in ordinary stock units of £1. In addition there is £143,855 in 6 per cent. debenture stock outstanding. Of this, there is no supply in the market. The ordinary shares are called 11s. 3d. middle. At 12s. the yield on a 6 per cent. dividend basis, would be 10 per cent. The chairman is Sir Alexander Roger, director also of seventeen other companies. The annual report usually appears in May and the dividend on the ordinary shares is paid in June.

## "Emmies"

Electric and Musical Industries shares hardened to 7s. 9d. after the meeting at which the chairman, in a very cautious speech, forebore to enter into the region of prophecy. From his observations it seems clear that television is not likely to be reintroduced, at any rate under current conditions, but Electric and Musical Industries is fully occupied. The remarkable change-over in the fortunes of the company from disappointment to profit, has led to a mild amount of speculation in the shares, but combining the recent report together with the speech of the chairman the present price may be said to represent its reasonable value. What the prospects are of the return of the company to a dividend-paying stage is impossible to estimate at the present time; in an undertaking of this kind, the scope for expansion in earnings and profits is considerable.

Telephone Rentals is paying an interim dividend of 4 per cent., the same as that of a year ago. The final dividend last year was 6 per cent., making 10 per cent. for the year, and if this is maintained the shares at the current quotation of 7s. 3d. will give a return of £6 18s. per cent. on the money.

## Compulsory Insurance

The Government's new compulsory insurance scheme is a tax to which opposition has arisen from some who regard the 10s. per cent., spread over five years of Government liability, as too high a rate for the risk insured against.

Its effects upon profits will vary according to the relation between the net revenue and the dividend. A company earning 20 per cent. on its ordinary capital and paying say 10 per cent. will probably be able to meet the insurance tax and still maintain its 10 per cent. dividend. But where a 10 per cent. dividend is distributed out of net earnings say of 11 or 12 per cent., the new tax may affect materially the disposable balance. The investor is again faced with a new—and at present incalculable—element of uncertainty, the possible implications of which can be measured only by the rough-and-ready method here indicated.

# ELECTRICAL COMPANIES' SHARES

## Prices, Dividends and Yields

| Company | 1940 Highest | 1940 Lowest | Dividend Previous | Dividend Last | Middle Price Dec. 23 | Rise or Fall | Yield p.c. £ s. d. |
|---|---|---|---|---|---|---|---|
| **Home Electricity Companies** | | | | | | | |
| Bournemouth and Poole | 63/6 | 36/6 | 15 | 15 | 43/9 | .. | — |
| British Power and Light | 30/– | 20/– | 7 | 7 | 26/– | .. | 5 7 8 |
| City of London | 28/– | 20/– | 7½ | 7½ | 21/3 | .. | — |
| Clyde Valley | 38/6 | 24/– | 8 | 8 | 33/9 | .. | 4 14 10 |
| County of London | 43/3 | 21/– | 10½ | 10½ | 32/– | +⅛ | 6 11 4 |
| Edmundson's: | | | | | | | |
| 7% Pref. | 32/– | 24/3 | 7 | 7 | 28/3 | .. | 4 19 1 |
| Ord. | 27/6 | 18/6 | 9 | 6 | 23/6xd. | .. | 5 2 2 |
| Elec. Dis. Yorkshire | 40/3 | 32/– | 9 | 9 | 32/6 | .. | 5 10 9 |
| Elec. Fin. and Securities | 42/– | 34/6 | 12½ | 12½ | 38/9 | .. | 6 15 0 |
| Elec. Supply Corporation | 48/– | 39/– | 12 | 11½ | 37/– | .. | 6 4 4 |
| Isle of Thanet | 16/– | 5/6 | 4 | 4 | 6/– | .. | — |
| Lancs Light and Power | 33/– | 21/6 | 7½ | 7½ | 27/6 | .. | 5 9 1 |
| Llanelly Elec. | 21/– | 17/– | 5½ | 5½ | 18/– | .. | 6 2 5 |
| Lond. Assoc. Electric | 21/– | 12/6 | 7 | 5½ | 13/9 | .. | — |
| London Electric | 35/– | 19/– | 8 | 7 | 20/– | .. | 7 0 0 |
| London Power Deb. Red. | 105½ | 100 | 5 | 5 | 102½ | +1 | 4 17 6 |
| Metropolitan | 41/6 | 22/6 | 12 | 10 | 32/– | +9d. | 6 5 0 |
| Midland Counties | 39/– | 23/3 | 8 | 8 | 32/6 | .. | 4 18 6 |
| Mid. Elec. Power | 40/– | 29/6 | 9 | 9 | 33/9 | .. | 5 6 8 |
| Newcastle Elec. | 29/9 | 22/6 | 7 | 7 | 22/6 | .. | 6 7 3 |
| North Eastern Elec.: | | | | | | | |
| Ordinary | 31/6 | 16/6 | 7 | 7 | 25/– | .. | 5 12 0 |
| 7% Pref. | 32/6 | 25/6 | 7 | 7 | 28/3 | .. | 4 19 1 |
| Northampton | 44/– | 38/– | 10 | 10 | 40/– | .. | 5 0 0 |
| Notting Hill 6% Pref. (£10) | 10½ | 9 | 6 | 6 | 9 | .. | — |
| Northmet Power: | | | | | | | |
| Ordinary | 42/3 | 22/6 | 10 | 10 | 31/3 | +6d. | — |
| 6% Pref. | 29/– | 23/– | 6 | 6 | 26/6 | .. | 4 10 7 |
| Richmond Elec. | 24/6 | 18/– | 7 | 6 | 18/9 | .. | — |
| Scottish Power | 38/– | 24/– | 8 | 8 | 33/3 | .. | 4 16 3 |
| Southern Areas | 21/3 | 12/9 | 5 | 5 | 14/6 | .. | 6 18 0 |
| South London | 23/3 | 20/– | 7 | 7 | 20/– | .. | 7 0 0 |
| West Devon | 20/– | 17/6 | 5 | 5 | 20/– | .. | 5 0 0 |
| West Glos. | 22/– | 15/– | 2½ | 4½ | 16/3 | .. | 5 10 10 |
| Yorkshire Elec. | 40/– | 23/6 | 8 | 8 | 33/9 | +6d. | 4 14 10 |
| **Overseas Electricity Companies** | | | | | | | |
| Atlas Elec. | 4/– | 1/3 | Nil | Nil | 1/9 | .. | — |
| Calcutta Elec. | 37/– | 22/6 | 10* | 8* | 32/6 | +1/– | 4 18 6 |
| Cawnpore Elec. | 30/– | 24/– | 10 | 10 | 26/3 | .. | 7 12 4 |
| East African Power | 25/6 | 19/6 | 7 | 7 | 20/9 | .. | 6 15 0 |
| Jerusalem Elec. | 24/– | 15/– | 7 | 7 | 20/– | +½ | 7 0 0 |
| Kalgoorlie (10/–) | 12/6 | 9/6 | 7½ | 7½ | 11/6 | .. | 6 10 5 |
| Madras | 26/9 | 21/6 | 8* | 6* | 25/– | .. | — |
| Montreal Power | 35½ | 30 | 1½ | 1½ | 32 | .. | — |
| Palestine Elec. "A" | 25/– | 10/– | 5* | Nil | 15/– | .. | — |
| Perak Hydro-electric | 20/3 | 13/– | 2½ | 6 | 16/3 | .. | 7 7 8 |
| Shawinigan Power | 27½ | 19 | 83cts. | 90cts. | 20 | .. | — |
| Tokyo Elec. 6% | 69 | 52 | 6 | 6 | 30 | .. | 20 0 0 |
| Victoria Falls Power | 75/9 | 56/6 | 15 | 15 | 70/– | .. | 4 5 9 |
| Whitehall Investments Pref. | 17/9 | 8/– | 7½ | 7½ | 10/– | .. | 15 0 0 |
| **Public Boards** | | | | | | | |
| Central Electricity: | | | | | | | |
| 1950–70 | 110½ | 104 | 5 | 5 | 109 | .. | 4 11 9 |
| 1955–75 | 112½ | 106 | 5 | 5 | 110 | .. | 4 11 0 |
| 1951–73 | 107½ | 102 | 4½ | 4½ | 105 | .. | 4 5 9 |
| 1963–93 | 96½ | 90 | 3½ | 3½ | 93 | .. | 3 15 3 |
| London Elec. Trans. Ltd. | 92 | 87½ | 2½ | 2½ | 93 | .. | 2 15 9 |
| London & Home Counties 1955–75 | 113½ | 105 | 4½ | 4½ | 105½ | .. | 4 5 4 |
| Lond. Passenger Transport: | | | | | | | |
| A | 116 | 104 | 4½ | 4½ | 108 | +1 | 4 4 0 |
| B | 116 | 102½ | 5 | 5 | 104 | .. | 4 15 8 |
| C | 65½ | 25 | 1½ | 1½ | 33 | .. | 4 11 0 |
| West Midland Joint Elec. 1948–68 | 106½ | 103 | 5 | 5 | 105½ | .. | 4 14 9 |
| **Telegraph and Telephone** | | | | | | | |
| American Tel. & Tel. | 230 | 176 | 9 | 9 | 200 | .. | 4 10 0 |
| Anglo-Am. Tel.: | | | | | | | |
| Pref. | 107 | 85 | 6 | 6 | 99 | +2 | 6 3 0 |
| Def. | 23½ | 18 | 1½ | 1½ | 23½ | +1 | 6 7 8 |
| Anglo-Portuguese | 22/6 | 10/– | 8 | 8 | 15/– | .. | 10 13 4 |
| Cable & Wireless: | | | | | | | |
| 5½% Pref. | 99½ | 66 | 4½ | 5½ | 92½ | +½ | 5 19 0 |
| Ord. | 65 | 27 | 4 | 4 | 54½ | −1 | 7 6 10 |
| Income | 99½ | 93 | .. | .. | 98½ | .. | 4 1 3 |
| Canadian Marconi $1 | 6/– | 4/– | Nil | 4cts. | 4/– | −6d. | — |
| Globe Tel. & Tel.: | | | | | | | |
| Ord. | 32/6 | 21/6 | 7½* | 6* | 26/3 | .. | 4 11 5 |
| Pref. | 27/9 | 22/6 | 6 | 6 | 25/– | .. | 4 16 0 |
| Great Northern Tel. (£10) | 20 | 11 | 20 | 20 | 12½ | +⅛ | — |
| Inter Tel. & Tel. | 5½ | 2½ | Nil | Nil | 3 | −½ | — |
| Marconi-Marine | 30/– | 18/3 | 10 | 7½ | 19/3 | .. | 7 13 10 |
| Oriental Telephone Ord. | 2⅞ | 45/– | 12* | 11½* | 2⅞ | .. | 4 16 10 |
| Telephone Props. | 15/– | 11/– | 6 | 6 | 11/3 | .. | 10 13 4 |
| Telephone Rentals (5/–) | 9/6 | 5/3 | 10 | 10 | 7/3 | .. | 6 18 0 |

| Company | 1940 Highest | 1940 Lowest | Dividend Previous | Dividend Last | Middle Price Dec. 23 | Rise or Fall | Yield p.c. £ s. d. |
|---|---|---|---|---|---|---|---|
| **Traction and Transport** | | | | | | | |
| Anglo. Arg. Trams: | | | | | | | |
| First Pref. (£5) | 4/3 | 1/– | Nil | Nil | 2/– | .. | — |
| 4% Inc. | 11½ | 2 | Nil | Nil | 9 | .. | — |
| British Electric Traction: | | | | | | | |
| Def. Ord. | 830 | 400 | 5 | 45 | 750 | .. | 6 4 4 |
| Pref. Ord. | 169 | 130 | 8 | 8 | 145 | +5 | 5 10 3 |
| Bristol Trams | 48/6 | 32/6 | 10 | 8* | 37/6 | .. | — |
| Brazil Traction | 12½ | 5½ | 81 | 50c. | 7 | +1½ | — |
| Calcutta Trams | 24/– | 16/3 | 8 | 5½ | 19/– | .. | 5 15 9 |
| Cape Elec. Trams | 18/6 | 16/– | 5 | 5 | 17/– | .. | 5 17 8 |
| Lancs Transport | 35/– | 27/6 | 10 | 10 | 35/– | .. | 5 14 3 |
| Mexican Light: | | | | | | | |
| 1st Bonds | 36 | 25 | 5 | 5 | 35 | +5 | — |
| Rio 5% Bonds | 95 | 74 | 5 | 5 | 85 | .. | 5 17 8 |
| Southern Rly.: | | | | | | | |
| 5% Prefd. | 79 | 35 | 5 | 5 | 46½ | .. | 10 15 0 |
| 5% Pref. | 104½ | 59 | 5 | 5 | 82½ | −1 | 6 1 3 |
| T. Tilling | 45/9 | 29/– | 10 | 10 | 39/6 | .. | 5 1 3 |
| Tilling & B.A. | 47/6 | 41/9 | 9* | 8* | 44/6 | .. | — |
| West Riding | 35/– | 25/– | 10 | 10 | 33/6 | .. | 5 19 5 |
| **Equipment and Manufacturing** | | | | | | | |
| Aron Electricity Ord. | 17/6 | 10/– | 15 | Nil | 15/– | .. | — |
| Assoc. Elec.: | | | | | | | |
| Ord. | 43/3 | 26/6 | 10 | 10 | 40/– | .. | 5 0 0 |
| Pref. | 36/6 | 32/3 | 8 | 8 | 35/– | .. | 4 11 5 |
| Automatic Telephone & El. | 47/3 | 32/– | 12½ | 12½ | 40/– | .. | 6 5 0 |
| Babcock & Wilcox | 50/– | 28/6 | 10 | 11 | 39/6 | .. | 5 11 2 |
| British Aluminium Ord. | 56/– | 29/– | 12½ | 12½ | 40/9 | .. | — |
| British Insulated Ord. | 92/6 | 67/– | 20 | 20 | 82/6 | +⅛ | 4 17 0 |
| British Thermostat (5/–) | 14/9 | 6/6 | 18½ | 18½ | 11/3 | .. | 8 4 6 |
| British Vacuum Cleaner (5/–) | 12/– | 4/9 | 40 | 12½ | 6/3 | .. | 10 0 0 |
| Brush Ord. | 4/6 | 1/9 | Nil | Nil | 3/9 | .. | — |
| Callender's | 69/– | 46/– | 15 | 15 | 62/6 | .. | 4 16 0 |
| Chloride Elec. Storage | 72/6 | 55/– | 15 | 15 | 60/– | .. | 5 0 0 |
| Consolidated Signal | 72/6 | 59/– | 36½ | 17 | 60/– | .. | 5 13 4 |
| Crabtree (10/–) | 24/9 | 17/6 | 17½ | 17½ | 22/6 | .. | 7 15 7 |
| Crompton Parkinson: | | | | | | | |
| Ord. (5/–) | 20/– | 12/– | 30 | 20 | 17/6 | .. | 5 14 3 |
| E. K. Cole (5/–) | 5/– | 2/6 | 10 | Nil | 4/6 | .. | — |
| Elec. & Musical Industries (10/–) | 10/3 | 4/3 | 5 | Nil | 7/9 | +3d. | — |
| Electric Construction | 36/3 | 27/6 | 13½ | 10 | 27/6 | .. | 7 5 6 |
| Enfield Cable Ord. | 56/– | 40/6 | 25 | 16½ | 46/3 | +½ | 7 0 8 |
| Electrical Switchgear (10/–) | 22/6 | 20/– | 16 | 10 | 20/– | .. | 5 0 0 |
| English Electric | 33/9 | 16/6 | 10 | 10 | 28/9 | −½ | 6 13 4 |
| Ensign Lamps (5/–) | 15/3 | 12/6 | 25 | 25 | 15/– | .. | 8 6 8 |
| Ericsson Tel. (5/–) | 39/3 | 23/– | 25* | 25* | 32/6 | .. | — |
| Ever Ready | 28/3 | 16/6 | 30 | 40 | 25/6 | .. | 7 16 10 |
| Falk Stadelmann | 18/3 | 12/6 | 6 | 7 | 14/6 | +9d. | 9 13 2 |
| Ferranti Pref. | 25/– | 22/– | 7 | 7 | 23/9 | .. | 5 18 0 |
| G.E.C.: | | | | | | | |
| Pref. | 32/6 | 26/– | 6½ | 6½ | 30/– | .. | 4 6 8 |
| Ord. | 83/3 | 53/3 | 20 | 20 | 77/– | .. | 5 4 0 |
| Greenwood & Batley | 25/6 | 20/– | 15 | 15 | 20/– | .. | 13 0 0 |
| Hall Telephone (10/–) | 18/6 | 8/9 | 15 | 10 | 11/3 | .. | 8 18 0 |
| Henley's (5/–) | 21/6 | 12/6 | 20 | 20 | 18/9 | .. | 5 6 8 |
| 4½% Pref. | 21/2 | 20/6 | 4½ | 4½ | 21/3 | .. | 4 4 8 |
| Hopkinsons | 46/9 | 32/6 | 12½ | 15 | 38/9 | .. | 7 14 10 |
| India-Rubber Pref. | 21/– | 19/6 | 5½ | 5½ | 20/– | .. | 5 10 0 |
| Intl. Combustion | 121/3 | 70/– | 32½ | 32½ | 44 | .. | 7 17 9 |
| J. Lucas | 60/6 | 40/– | 15 | 15 | 50/9 | +2/– | 5 18 0 |
| Johnson & Phillips | 50/9 | 32/6 | 12½ | 15 | 45/– | .. | 6 13 4 |
| Lancashire Dynamo | 59/9 | 47/6 | 25 | 20 | 47/6 | .. | 8 8 5 |
| Laurence Scott (5/–) | 11/– | 6/– | 15 | 15 | 7/– | .. | 10 14 2 |
| London Elec. Wire | 25/6 | 20/– | 7½ | 7½ | 22/6 | .. | 6 13 4 |
| Mather & Platt | 46/6 | 30/– | 13½ | 10 | 34/6 | .. | 5 16 0 |
| Metropolitan Elec. Cable Pf. | 22/– | 21/3 | 5½ | 5½ | 21/3 | .. | 5 3 6 |
| Murex | 86/9 | 52/6 | 20 | 20 | 77/6 | −⅛ | 5 3 3 |
| Pye Deferred (5/–) | 9/– | 6/9 | 25 | 25 | 8/9 | .. | 14 5 8 |
| Revo (10/–) | 20/9 | 11/6 | 17½ | 5 | 17/6 | .. | 2 17 6 |
| Reyrolle | 60/6 | 41/– | 12½ | 12½ | 46/3 | .. | 5 8 2 |
| Siemens Ord. | 23/9 | 15/6 | 7½ | 7½ | 17/6 | .. | 8 11 6 |
| Strand Elec. (5/–) | 2/3 | 9d. | 10 | 4 | 1/3 | .. | 16 0 0 |
| S. Smith (1/–) | 8/– | 3/6 | 37½ | 50 | 7/6 | .. | 6 13 4 |
| Switchgear & Cowans (5/–) | 11/9 | 5/6 | 20 | 10 | 7/6 | .. | 6 13 4 |
| Telegraph Condenser (10/–) | 8/9 | 6/3 | 5 | .. | 7/6 | .. | — |
| Telegraph Construction | 42/6 | 29/– | 10 | 10 | 33/9 | .. | 5 18 6 |
| Telephone Mfg. (5/–) | 9/– | 5/– | 9 | 9 | 7/– | .. | 6 8 7 |
| Tube Investments | 96/9 | 59/– | 23¾ | 23¾ | 92/6 | +5/6 | 5 4 0 |
| Vactric (5/–) | 3/6 | 2/– | 4 | Nil | 2/3 | .. | — |
| Vickers (10/–) | 22/– | 9/6 | 10 | 10 | 14/9 | .. | 6 15 7 |
| Ward & Godstone (5/–) | 19/9 | 12/6 | 20 | 20 | 12/6 | .. | 8 0 0 |
| Westinghouse Brake | 46/– | 30/6 | 17½ | 10 | 37/6 | .. | 5 6 8 |
| Walsall Conduits (4/–) | 26/6 | 17/6 | 55 | 55 | 23/9 | .. | 9 5 0 |
| West, Allen (5/–) | 7/– | 3/– | 7½ | 10 | 3/9 | .. | 10 0 0 |

* Dividends are paid free of Income Tax.

# CONTRACT INFORMATION

## Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

## Contracts Open

*Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.*

**Birmingham.**—January 15th. Salvage Department. 44 lead plate batteries for electric refuse vehicles. (See this issue).

**Dundee.**—December 30th. Corporation Lighting Committee. Emergency lighting installation at the Central Police Station, Bell Street. Particulars from the city quantity surveyor, 21, City Square. Tenders to the town clerk.

**Kilkenny.** — December 30th. County Board of Health and Public Assistance. Duplicate pumping equipment, electric motors, switchgear, etc., in connection with the Johnstown and Urlingford water supply. Specifications from T. Kelly, Engineer's Office, Central Hospital, Kilkenny (deposit, £5 5s.). Tenders to the Commissioner of the Board.

**New Mills.**—December 30th. Electricity Department. 11,000-V switchgear. (December 13th.)

**New Zealand.** — WELLINGTON. — Public Works Department. January 14th. Two 3,000-kVA, 11-kV, three-phase, 50-cycle outdoor-type voltage regulating transformers and control equipment. (T.22238/40.)*

January 29th. Post and Telegraph Department. Condensers, conductor cords and headbands. (T.23413/40).*

**South Africa.**—PRETORIA.—Union Tender & Supplies Board. January 4th. Plant at Gasworks, Cottesloe: (a) One 200-kW rotary converter and associated equipment. Alternatively (b) one 200-kW mercury arc rectifier or (c) two 100-kW mercury arc rectifiers. (d) Equipment for spare power circuit frame. (T.22424/40.)*

January 30th. Union Tender & Supplies Board. 200 lightning protectors. (T.23336/40.)*

January 16th. One 5-kW, 220/380-V alternator, direct coupled to a water-cooled petrol engine. (T.23310/40.)*

CAPE TOWN.—January 28th. Electricity Department. Three oil-immersed single-phase 270-kVA transformers. (T.23173/40.)*

January 29th. Air conditioning plant. (T. 23387/40).

## Orders Placed

**Bedford.** — Electricity Committee. Accepted. Five 36in. fans (£372).—Sturtevant Engineering Co.

**Chester.**—Electricity Committee. Recommended. Portable electric conveyor for power station (£208). C. H. Johnson & Sons, Ltd.

**Glasgow.**—Transport Committee. Accepted. Trolley wire.—Richard Johnson & Nephew, Ltd.; I.C.I. Metals Ltd. Axle bushes.—Anti-Attrition Metal Co., Ltd.

**London.**—DEPTFORD.—Health Committee. Accepted. Tubular electric heating at central clinic shelter (£51).—Read & Partners.

**Manchester.**—Waterworks Committee. Accepted. Sub-contracts for supply and erection of electrically-driven pumping plant. —Electric motors.—Crompton Parkinson. Motor starters.—Brookhirst Switchgear. Sluice and reflux valves.—Glenfield and Kennedy. Mather & Platt, Ltd., have been accepted as sub-contractors for electric motors required in connection with rotary water strainers at Godley.

**Middlesbrough.**—Town Council. Accepted. Cables.—Britannic Electric Cable and Construction Co.

**Pittenweem (Fife).**—Town Council. Accepted. Electric heating and lighting at the burgh fire station.—Moncrieff Bros.

**Tynemouth.**—Town Council. Accepted. Indoor telephone system at the police buildings (£178).—Dictograph Telephones, Ltd.

## Contracts in Prospect

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Ardwick.**—Additions to electricity depot, The Polygon; H. C. Lamb, chief engineer, Electricity Department, Dickinson Street, Manchester.

**Armagh.**—Water scheme for County Mental Hospital, Castledillon (£8,000), for C.C.; Ferguson and M'Ilveen, Belfast.

**Bacup.**—Dairy, etc., Lower Reaps Farm; R. Temperley, 2, Sunny Bank, Todmorden Road.

**Baguley.**—Extensions to hospital for nurses' sleeping quarters; Adshead, Topham and Adshead, architects, 14, Ridgefield, Manchester.

**Barnard Castle.**—Three buildings for water chlorination plants for R.D.C.; H. A. Smith, 43, Galgate, Barnard Castle.

**Bath.**—Extensions to Isolation Hospital, Claverton Down; borough surveyor, Guildhall, Bath.

**Batley.**—Works, Grange Road, Soothill; A. J. Riley & Son, Ltd., Victoria Works, Bradford Road.

Works additions; Geo. Hirst & Son, Britannia Mills, Birstall, Batley.

**Blackpool.**—Assembly Hall and canteen, Hornby Road, for Y.M.C.A.; H. &. J. R. Bradshaw, builders, Hill Lane, Blackley, Manchester.

Emergency schools; Education Committee.

Additions, Promenade; Savoy Café, Ltd.

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**Financial Section** *(Concluded from page 192)*

**Isle of Arran Electric Light & Power Co., Ltd.**—Capital, £20,000 in 1,000 preference and 19,000 ordinary shares of £1. Return dated July 31st, 1940. 1,000 preference and 17,700 ordinary shares taken up. £17,500 paid on 17,500 ordinary shares. £1,200 considered as paid on 1,000 preference and 200 ordinary shares. Mortgages and charges: Nil.

**Austin Walters & Son, Ltd.**—Capital, £10,000 in £1 shares. Return dated June 18th, 1940. 5,406 shares taken up. £4,406 paid. £1,000 considered as paid. Mortgages and charges: £3,600.

**Hope's Heating & Lighting, Ltd.**—Capital, £50,000 in 50,000 ordinary shares of £1 each. Return dated July 1st, 1940 (filed August 2nd, 1940). 27,000 shares taken up, £12,737 paid. £14,263 considered as paid. Mortgages and charges: Nil.

**Carter & Co. (Nelson), Ltd.**—Capital, £5,000 in £1 shares. Return dated May 9th (filed August 15th), 1940. 4,150 shares taken up. £4,150 paid. Mortgages and charges: Nil.

## Increases of Capital

**Perihel Export, Ltd.**—The nominal capital has been increased by the addition of £900, in £1 ordinary shares, beyond the registered capital of £100.

**McMurdo Instrument Co., Ltd.** — The nominal capital has been increased by the addition of £1,000 beyond the registered capital of £10,000. The additional capital is divided into 1,000 5 per cent. non-cumulative preference shares of £1.

**William Stewart & Co., Ltd.**—The capital has been increased to £3,800 by the addition of £1,000 divided into 1,000 ordinary shares of £1 each.

## Liquidations

**Great Eastern Electric Co., Ltd.**, wireless dealers, 30, Ely Place, London, E.C.1.—Meetings of creditors and shareholders were held on December 10th at Carey Street, London, W.C. The Official Receiver reported that the company was promoted in March, 1939, by Mr. John Braham, who was the managing director of a company of the same name which went into liquidation. At the outbreak of war the trading declined and when creditors began to press the business was closed down. The liabilities had been estimated at £544, of which £361 was due to Mr. Braham, and there were no assets. The liquidation was left in the hands of the Official Receiver.

**Ever-Ready Electric Carbon Co., Ltd.**—Meeting January 10th at Ever-Ready Works, Hercules Place, Holloway, N.7, to receive an account of the winding-up by the liquidator, Mr. J. W. Molineaux.

### Winding-up Petition Dismissed

**Champion Radio Valve Corporation, Ltd.**—In the Companies Court on December 16th Mr. Justice Bennett had before him the petition for the compulsory winding up of Champion Radio Valve Corporation, Ltd. Mr. G. O. Slade announced that the parties had now come to terms and he asked that the petition should be dismissed, with no order as to costs.

His Lordship acceded to the request.

## Bankruptcies

**R. Jackson**, electrician, 5, Romney Avenue, Dalton-in-Furness, lately trading at 38, Whalley Range, Blackburn.—Public examination January 3rd, at Barrow-in-Furness and Alverston.

**H. J. Gill**, electrical engineer and radio dealer, 10, High Street, Keynsham, Somerset. —Public examination January 17th, at Bristol.

**J. N. Hogg**, electrical engineer, 104, Allerton Road, and 16, Woolton Street, Woolton, both in Liverpool.—Last day for receiving proofs for dividend, December 26th. Trustee, Mr. P. S. Booth, 2, Bixteth Street, Liverpool.

Alterations and additions, Carshalton Road, and 23, Promenade; Ornstein & Mansoff, Ltd.

Alterations and additions, Railway Inn, Bonny Street; Blackpool Tower Co., Ltd.

Fire station, Coleridge Road; Waller & Hartley, Ltd.

**Burnley.**—Weights and Measures Offices, Finsley Gate, for Town Council; J. L. Beckett, borough engineer, Town Hall.

**Caernarvon.**—Installation of electric lighting in Llandegfan Parish Church; Miss Johnston, Bryn Mel, Glyn Garth, Caernarvon.

**Chesterton (Staffs.).**—Works additions, Deans Lane; Richard Howle & Sons, Red Street.

**Collyhurst.**—Re-building "Three Tuns" Hotel, for Threlfall's Brewery, Ltd.; B. Waterhouse, architect, 134, Deansgate, Manchester, 3.

**Cookham.**—Office additions, garage, and dry store; Odeon Theatres, Ltd.

Schoolroom, Herries School, Cookham Dean; Mrs. B. M. H. Goddard.

**Coventry.**—Elementary School, Charter Avenue, for Electricity Committee; D. E. E. Gibson, city architect, 1A, Warwick Row.

Offices; Grand Union Canal and Carrying Co., Ltd., Foleshill Road.

Offices; H. M. Hobson (Aircraft & Motor Components), Ltd., Holbrook Lane.

**Derby.**—Emergency hospital, for Town Council; city engineer, Corporation Offices, Derby.

**Doncaster.**—Completion of Nurses' Home at Doncaster Royal Infirmary for Board of Governors; W. A. Pite, Son & Fairweather, architects, 12, Carteret Street, Queen Anne's Gate, S.W.1.

Extensions to central fire station for Town Council; P. P. Taylor (Doncaster), Ltd., builders, 6, South Parade, Doncaster.

**Dundee.**—Workshop premises, Balgray Place; Urquhart Lindsay and Robertson Orchar, Ltd.

Additions, Perth Road; Fernbrae Nursing Home.

**Dunston-on-Tyne.**—Store and warehouse for the North Eastern Trading Estate, Ltd.; Cackett, Burns Dick and McKellar, Ellison Place, Newcastle, architects.

Alterations and extensions to a factory for Jayes' Clothing Co.; Newcombe and Newcombe, Eldon Square, Newcastle, architects.

**Enfield.**—Extensions, Technical College (£5,653); Wm. Moss & Sons, Ltd.

**Exeter.** — Communal feeding scheme; Borough engineer.

**Fletton.**—Police station and buildings (£9,178) for Hunts. County Council.

**Gallt-y-Sil.**—Extensions to the Isolation Hospital for Caernarvonshire Health Committee; county architect, County Buildings, Caernarvon.

**Gateshead-on-Tyne.**—Alterations and improvements to the Prince Albert Inn for Ridley, Cutter & Firth; Hetherington and Wilson, County Chambers, Newcastle-on-Tyne, architects.

Canteen and extensions to condenser house at Victoria Works, for Clarke Chapman & Co., Ltd.

**Gorton.**—Works extensions, Gorton Lane; Beyer Peacock & Co., Ltd., Gorton.

**Gravesend.**—Additions, ice factory, West Street; G. E. Wallis & Sons, Ltd.

**Guildford.** — Proposed public library (£3,000), for Town Council; borough engineer, Municipal Offices, High Street, Guildford.

**Hemel Hempstead.**—Temporary factory, Three Cherry Trees Lane; Duncan Tucker (Tottenham), Ltd., Lawrence Road, N.15.

Alterations and temporary store, 145, London Road; W. L. Beasley.

**Hurley.**—Additions and alterations, East Arms Hotel; H. Bay.

**Keighley.**—Social room and canteen at The Cross for parish church authorities; Rev. T. N. Benson, curate, Keighley Parish Church.

**Lindsey.**—Alterations to sanitary block, King Edward VI Grammar School, Louth, for Electricity Committee; county architect, County Offices, Newland, Lincoln.

**Liverpool.**—Buildings at Lime Street Station; A. K. Wallace, chief engineer, Euston Station, L.M.S., N.W.1.

Factory, Love Lane; R. Costain & Sons Liverpool), Ltd., Barlows Lane, Fazakerley.

**London.**—Kitchen equipment (£50,000); L.C.C. Emergency Committee.

Additional plant for air raid precautions (£32,450), for Metropolitan Water Board, 173, Rosebery Avenue, E.C.1.

**Luton.**—School, Riddy Lane, Limbury, for Electricity Committee; borough engineer, Town Hall, Luton.

**Manchester.**—Alterations for showrooms and offices, Mosley Street; Cables and Wireless, Ltd., Electra House, Victoria Embankment, London, W.C.2.

**Milford - on - Sea.** — Conversion of White House to hostel (£4,692); Middlesex county engineer.

**Mottram.** — Works, Stalybridge Road; Walter Heys & Sons.

**Mundesley - on - Sea.**—Equipment of Clarence Hotel as institution (£1,500); Middlesex County engineer.

**Neath.**—Fire station buildings and extensions for R.D.C.; J. T. Jones, engineer, 13, Orchard Street.

**Newcastle-on-Tyne.**—Additions and alterations, The Lodge, St. Andrew's Cemetery, for Town Council; city engineer, Town Hall, Newcastle-on-Tyne.

Additions to premises in Erick Street for the City Council; city estate and property surveyor, Town Hall.

Offices for W. B. Reid & Co., Ltd., brewers; Hetherington and Wilson; County Chambers, Newcastle, architects.

Store and warehouse for Parker, Ltd., confectioners, Welbeck Road; Newcombe and Newcombe, Eldon Square, Newcastle, architects.

**Northampton.**—Works extensions; Manfield & Sons, Ltd., boot & shoe makers, Wellingborough Road.

Extensions to factory, Lea Road; J. Sears & Co., Ltd.

Additions food stores, Byron Street; G. Civil, Ltd.

**Northenden.**—Additions to factory for offices, Sharston Road; H. S. Fairhurst and Son, architects, 55, Brown Street, Manchester.

**Old Trafford.**—Canteen for works, Montagu Road; Fisher Renwick, Ltd., transport contractors, Chester Road.

**Openshaw.**—Works extensions, Ashton Old Road and Cornwall Street; B. & S. Massey, Ltd., engineers, Openshaw.

**Ormskirk.** — Sewerage scheme, Melling (£3,724), for West Lancs. R.D.C.; surveyor, Rural District Council Offices, 52, Derby Street, Ormskirk.

Improvements to fire brigade headquarters for U.D.C.; E. J. Wright, surveyor, Council Offices.

**Portsmouth.**—Additions to offices, London Road, Hilsea; Waring (Contractors), Ltd., London Road, Hilsea.

Rebuilding shops and flats, 37, Palmerston Road, Southsea; John Lay & Co., Ltd., builders, Arundel Street, Portsmouth.

**Rotherham.**—Extensions to offices, etc. Ickles Works; Steel, Peech and Tozer, Ltd.

**Runcorn.**—Extensions to A.F.S. station, Lowlands Road for U.D.C.; A. B. Cunningham, surveyor, Town Hall.

**Shoreham.**—Proposed new police station, for West Sussex County Council; county architect, County Hall, Chichester.

**Slough.**—Adaptation of Upton Towers, Sussex Place, as hospital, for Bucks County Council; county architect, County Offices, Aylesbury.

**Stockton-on-Tees.**—Eight A.F.S. action stations for the Town Council (£2,800); A. S. Knolles, borough engineer.

**Stranraer.**—Additions to factory for Wigtownshire Farmers' Bacon Co., Ltd.; manager.

**Stretford.**—Alterations to Public Hall, Chester Road, for Town Council; E. Parker, borough engineer, Town Hall.

**Teddington.**—Completion of workshop premises, Stella Works, Stanley Road; J. Jeffreys & Co., Ltd.

Engine house, Manor Road; W. & F. Doughty, Ltd., builders and contractors.

**Trafford Park.**—Works additions; Trussed Concrete Steel Co., Ltd., Mosley Road.

**Twickenham.** — Factory reconstruction, Beaufort Mews; Brewer, Smith and Brewer, architects, 11, The Green, Richmond.

**Tynemouth.**—Seven cafés; borough engineer.

**Walsall.**—Conversion of public house to police station; borough engineer.

**Wirral.**—Y.M.C.A. hall and recreation room at West Kirby; Hubert A. Thomas, architect, 36, Dale Street, Liverpool.

**Wolverhampton.**—Decontamination and first aid station; Guy Motors, Ltd.

Works additions, Frederick Street; G. C. Blane.

Rebuilding premises, Birmingham Road; Victory Plating Co.

Factory extension, Pool Street; Eadie & Co., Ltd.

**York.** — Additions, Black Swan Inn, Peaseholm Green & Punchbowl Inn, Stonegate; Tadcaster Tower Brewery Co. Ltd.

Canteen, Boroughbridge Road; British Sugar Corporation Ltd.

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## I.E.E. Benevolence

ALTHOUGH, as a result of the efforts of successive Presidents and Local Centre committees, the state of the Benevolent Fund of the Institution of Electrical Engineers has improved during the last two or three years, the position cannot yet be regarded as satisfactory. In the first place, it is supported financially by only one-third of the membership, whereas some contribution (however small) should surely be regarded on principle as part of the expenditure incurred on the privilege of belonging to the Institution. At the present time subscriptions to the Fund can also be looked upon as war savings, since any surplus would, of course, be invested in Government loans. The income for the current year is likely to be considerably reduced, as it will lack the formerly substantial contributions made by the Electrical Engineers' Ball and other social functions. The President, Mr. J. R. Beard, makes specific appeals for assistance not only to non-subscribers but also to existing subscribers to raise the average income above 3s. 8d. per member, to industrial concerns and public utility undertakings whose technical staffs might one day be helped by the Fund, and to overseas members who may be better able to afford generosity than are many in the Mother Country in these difficult times.